telephony

DECEMBER 17, 1984

THE JOURNAL OF TELECOMMUNICATIONS SINCE 1901

TOP NEWS: Government eyes challenge to divestiture, p.13

Cover: Introducing the service office of tomorrow—today, p.32


WINDSOR TASTE BEATS
Indiana Bell
SIECOR OPTIC

When you really need a fiber optic cable supplier you can count on, call on Siecor.

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The goal was set in July, 1983: Complete a fiber optic cable route for an official telecommunications service across Indiana in less than six months.

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Siecor does it all. Siecor committed to supply all fiber optic cable, hardware, splicing and testing equipment and special training to finish the entire project on schedule.

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In all, the installation and splicing of the 300-mile route took just 90 days—and included over 200 splice points with a total of approximately 2,250 splices. Upon its completion, Indiana Bell became the first Bell operating company to use singlemode fiber optic cable in a communications network.

Siecor had kept its promise to Indiana Bell to provide the most advanced fiber optic technology—such as the first use of Micro-Bundle™ cable design and the first application of five-kilometer lengths of cable—and the in-depth field support to make it work. In fact, end-to-end testing of the new system showed that it even exceeded performance specifications by 30%!

Siecor leads the field. The success of installations such as this one at Indiana Bell has thrust Siecor into a commanding role of leadership as a supplier of fiber optic cable, hardware and support services.

Write for free editorial report on the Indiana Bell optical cable project—and see how Siecor can benefit your next project, too.

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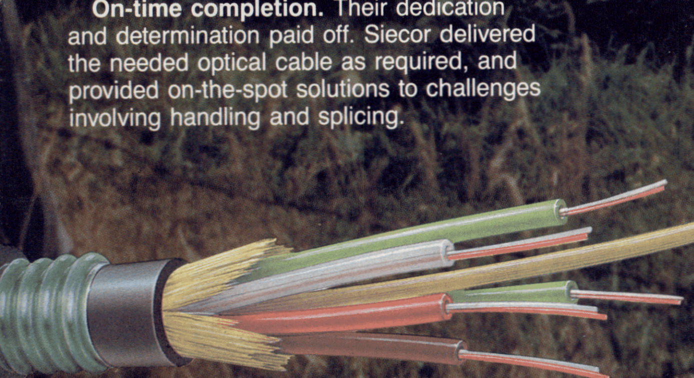

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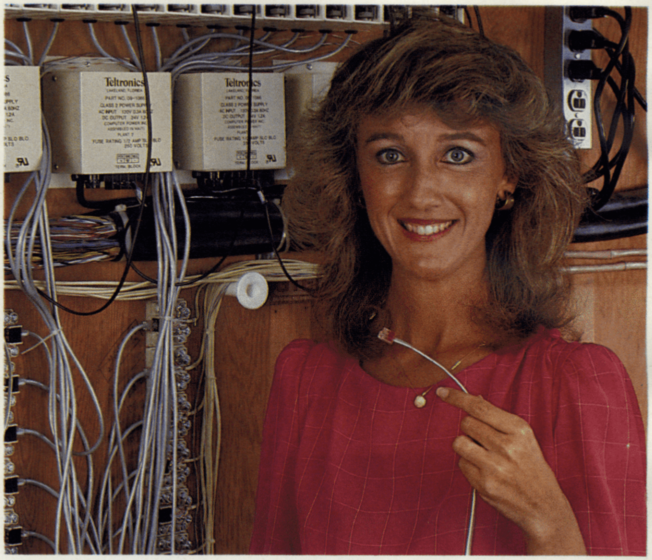
The Totalizer

For the lodging Industry



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- The Totalizer CPU can be connected to existing CRT and printer.
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  - system has built in dialers
  - no costly PBX software or SMDR upgrade packages required
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For more information call Teltronics: 813-688-6831 Ext. 230. Watch for Law Office/Attorney Totalizer, first quarter 1985.

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VOLUME 207
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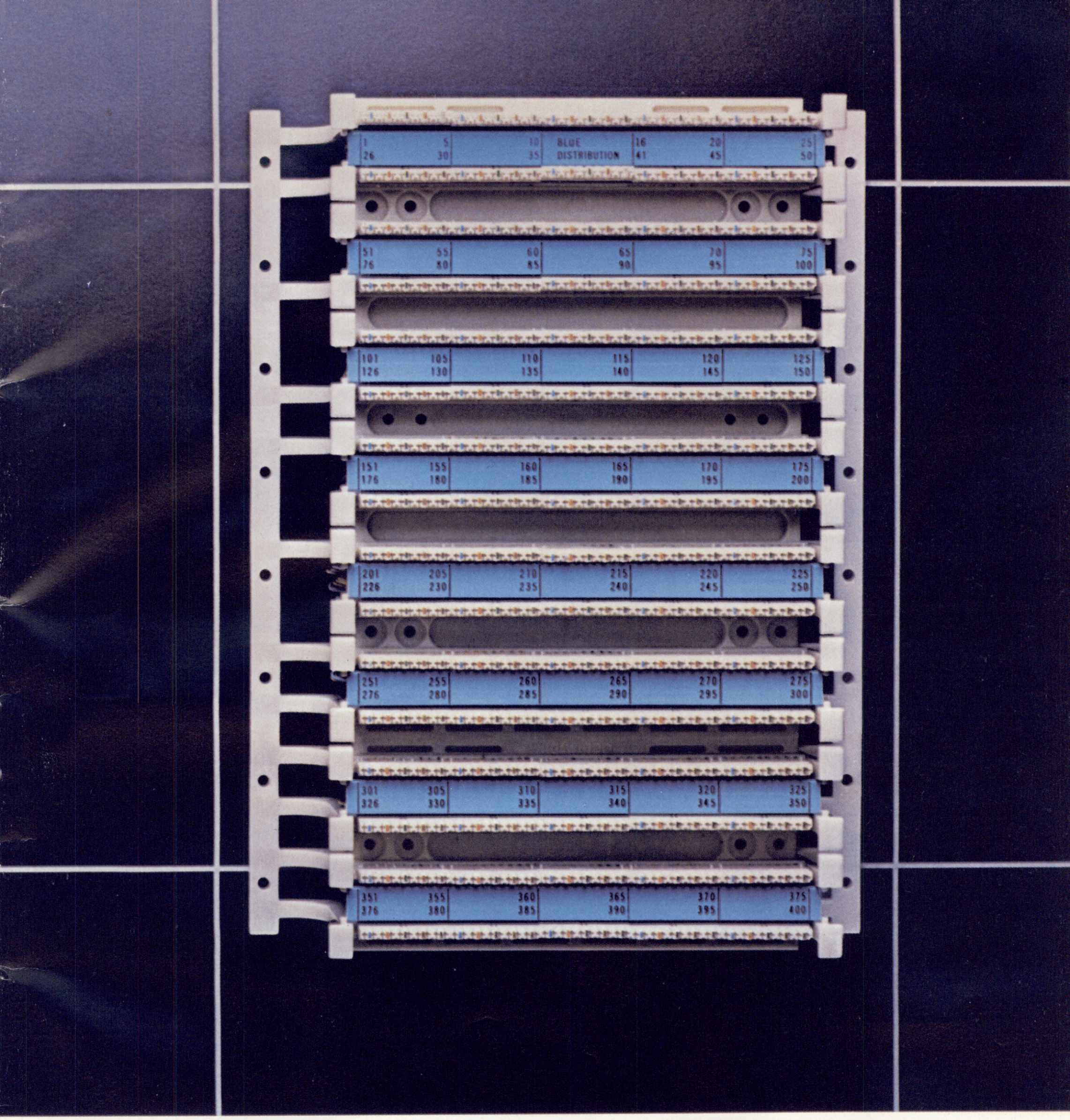
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December 17, 1984 Vol. 207

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MEETINGS

TELEPHONY's "Meetings" section provides chronological listings of telephone association and industry related meetings, giving date, state, site, hotel, plus an official convention information telephone number.

Telephone Association Meetings

Feb. 6-7, 1985, **New Hampshire,** Manchester, Sheraton-Wayfarer, 603/859-3770

Feb. 12-14, 1985, **USTA/USTSA Showcase,** New Orleans, New Orleans Expo Center, 312/332-1991

Feb. 13-15, 1985, **Louisiana,** New Orleans, Monteleone Hotel, 318/625-4009

March 10-13, 1985, **California-Western Rural,** Monterey, Calif., Doubletree Inn, 707/544-6863

March 17-20, 1985, **Minnesota,** Bloomington, Radisson South Hotel, 612/-291-7311

April 15-18, 1985, **IntelExpo '85 U.S. Telecommunications Suppliers Assn. (USTSA),** Washington, Washington Convention Center, 312/782-8597

April 23-25, 1985, **South Carolina,** Charleston, Sheraton Hotel, 803/324-6027

May 6-8, 1985, **Alaska,** Fairbanks, Traveler's Inn, 907/563-4000

May 8-10, 1985, **Kentucky,** Lexington, Marriott Resort Inn, 606/273-2013

May 8-10, 1985, **Oregon,** Portland, Mariott Hotel, 503/581-7430

May 14-16, 1985, **Washington,** Pasco, Red Lion Inn, 206/352-5453

May 15-18, 1985, **Virginia,** Hot Springs, The Homestead, 804/643-0688

May 19-22, 1985, **Wisconsin,** Lake Geneva, Americana Resort, 608/231-2477

May 21-23, 1985, **USTA/USTSA Western Showcase,** Las Vegas, Nev., Convention Center, 312/332-1991

May 22-25, 1985, **Florida,** Palm Beach Gardens, PGA Sheraton, 904/877-5141

June 5-6, 1985, **Maine,** Rockland, Samoset Resort, 207/763-9911

June 9-12, 1985, **New York,** Grossinger, Grossinger's Hotel, 518/462-6696

June 16-18, 1985, **Illinois,** Springfield, Holiday Inn East, 217/525-1044

Industry Related Meetings

Consumer Electronics, Jan. 5-8, 1985, Convention Center, Las Vegas, Nev., 202/457-8700

PTC (Pacific Telecommunications Council), Jan. 13-16, 1985, Sheraton Waikiki, Honolulu, 808/949-5752

2nd Annual BizTelCom-North-east Show, Jan. 16-18, 1985, The Aspen Hotel-Manor, Parsippany, N.J., 609/698-7020

13th Annual BICSI (Building Industry Consulting Service International) Conference, Jan. 22-24, 1985, Holiday Inn Airport, Tampa, Fla., 813/974-2403 or 813/224-4204

Communication Networks Conference & Exposition, Jan. 28-31, 1985, Washington, D.C. Convention Center, Washington, 617/879-0700

25th Annual Telephone Technicians Conference, Feb. 5-7, 1985, Sheraton Galleria, Bismarck, N.D., 701/671-2610

M/C Expo '85, National Mobile Communications Exposition and Conference, Feb. 12-14, 1985, Disneyland Convention Center, Anaheim, Calif., 213/826-6070

IEEE International Solid-State Circuits Conference, Feb. 13-15, 1985, New York Hilton, New York, 305/446-8193/4

Interface 85, March 4-7, 1985, Georgia World Congress, Atlanta, 617/449-6600

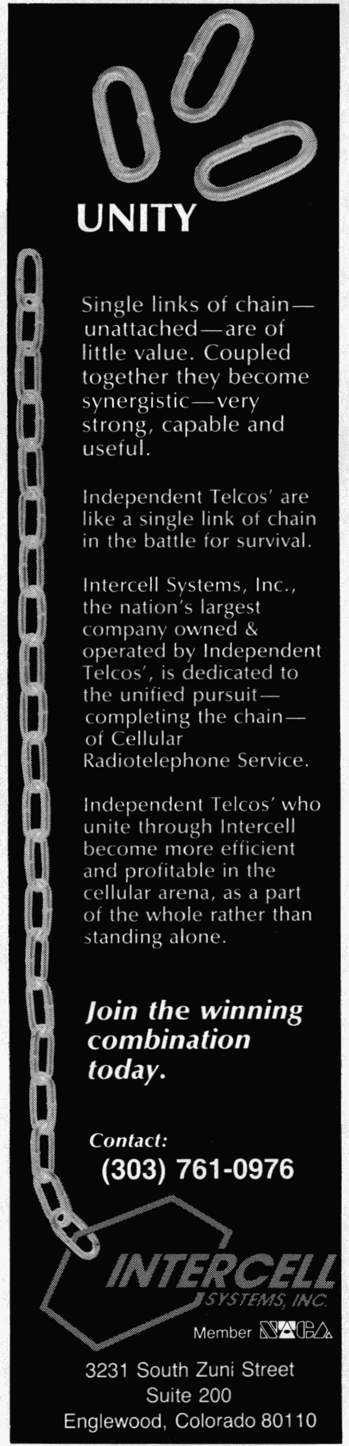
ISDN '85, the International Integrated Services Digital Networks Exposition, March 6-8, 1985, Casino Hotel, Atlantic City, N.J., 617/787-1776

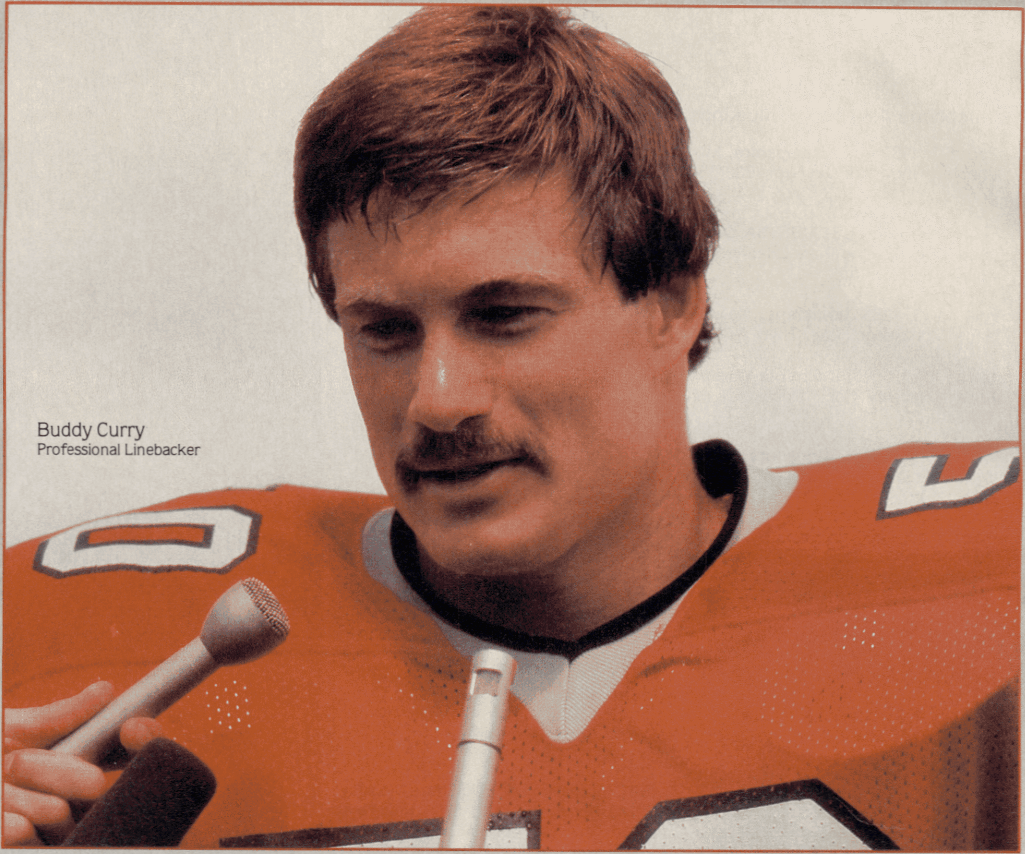
Tele-Communications Assn.'s Tele-Communications Northwest Teleconference, March 17-19, 1985, Westin Hotel, Seattle, 206/522-3100

Comtel '85, International Computer and Telecommunications Conference, March 18-20, 1985, Infomart, Dallas, 214/631-6482

Teleconferencing '85, May 13-16, 1985, Center for Interactive Programs, University of Wisconsin-Extension, Madison, Wis., 608/262-2569

Videotex '85, June 24-26, 1985, The New York Hilton, New York, 212/279-8890

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NEWS OF THE WEEK

Mann succeeds Schwartz as SBS CEO

Marvin L. Mann has been named president and chief executive officer of Satellite Business Systems, McLean, Va. He succeeds Stephen B. Schwartz, who has joined International Business Machines Corp. (IBM), as Assistant Group Executive for the Telecommunications Products Organization in the Information Systems and Communications Group.

Mann was vice president and general manager of IBM's Lexington Products Business Unit in the Information Products Div. Schwartz, who headed SBS since Jan. 13, 1984, previously had been an IBM vice president. Schwartz will continue to be associated with SBS as chairman of its Partners' Committee and a member of the Executive Committee.

SBS is a nationwide communications company which provides advanced private network services to large businesses and SBS Skyline long distance services to business and residential subscribers. The company is a partnership between Aetna Life & Casualty and IBM.

Phillips & Brooks acquires Suntel

Phillips & Brooks, Inc. has acquired Suntel, Inc., a public telephone refurbishment company in Sanford, N.C.

Suntel will be operated as a division of Phillips & Brooks and will offer public telephone refurbishment and general repair of telephones from Northern Telecom, Western Electric and Automatic Electric.

Phillips & Brooks, Cumming, Ga., provides enclosures for the public telephone industry.

OBC, ADP announce consultant service

Ohio Bell Communications, Inc. (OBC) and the Network Services Div. of Automatic Data Processing, Inc. (ADP) have announced a consultant service which will evaluate network telephone services and their related costs for businesses.

With the new service, called Network Management Services, (NMS), a firm's network calling patterns are computer-analyzed and compared to the tariffs of major long distance suppliers to determine the most cost-effective routing.

Estimates will be developed by Ohio Bell Communications. The cost is relative to the volume and complexity of the firm's network usage.

COMSAT ends talks with Prudential

Communications Satellite Corp. (COMSAT) has terminated negotiations with Prudential Insurance Co. of America and

Continued on page 86

Government may consider divestiture challenge

VICTOR BLOCK
Washington Editor

The Reagan administration reportedly is considering challenges to the American Telephone & Telegraph Co. (AT&T) divestiture judgment to open the door to increased activities by the regional holding companies in non-telephone related areas. But some officials concede that any such moves are likely to be opposed by U.S. District Judge Harold H. Greene, who oversees implementation of the agreement (see story on p.16), and perhaps by the Dept. of Justice (DOJ) and AT&T itself.

In a letter to the DOJ, David J. Markey, assistant secretary of commerce for communications and information, said restrictions intended to prevent the regional telephone companies from using earnings from regulated activities to help finance unregulated ones are "economically flawed." He said the Commerce Dept. does not agree that "the national interest is furthered by placing needless, artificial restrictions on the activities of companies that constitute half of the telecommunications industry, particularly given the rapid changes in technology characteristic of this industry."

A major focus of attack by Markey is what he says is the adverse impact of the restrictions on efforts by U.S. telecommunications firms to compete in the international marketplace. While he has not specified exactly what changes the Commerce Dept. might seek in the restrictions, other sources predict the agency might ask Greene to allow the regional companies a go-ahead to compete overseas—possibly by manufacturing hardware in other countries for sale in foreign markets and offering consulting services. Some Commerce officials also oppose the ban on long distance services by the regional operating carriers.

A major question mark facing any such move by the Commerce Dept. is the extent to which it will be opposed by Greene, the DOJ and AT&T—the latter on the grounds that any greater freedom by the regional companies to provide additional services will represent increased competition.

Tellabs, AT&T-IS ink supply agreement

Tellabs, Inc. and AT&T Information Systems (AT&T-IS) have signed 2-year contracts under which AT&T-IS will provide Tellabs data communication products to its customers.

Under the agreements, custom version of the 430 T-Plexers, 331 Xplexers and 330 Dataplexers will be marketed under the AT&T-IS label as part of the Dataphone II line of data communications equipment. According to Tellabs, the company expects the agreements to generate revenues of approximately $25 million.

AT&T-IS also will provide technical support, installation and maintenance for the products. Tellabs will continue to market its data products to its current customers.

BOCs to buy $700 million from Northern: CEO

LEO ANDERSON
Publisher

Edmund B. Fitzgerald, president and chief executive officer of Northern Telecom Ltd., Mississauga, Ontario, says he expects his company's sales to Bell operating companies (BOCs) in 1984 will be

Continued on page 22

Ericsson suggests 12 crucial questions to ask a supplier of cellular telephone systems-before you sign on the dotted line.

Going into the cellular business involves a long-term investment—with many potential "hidden costs" that could make your system unprofitable from the beginning. And obsolete in a few years.

Ask your potential supplier the following questions, and you'll *know* what kind of system you're getting.

Or what you're getting into.

1. Am I specifying the best system for the quickest payback?

A system that's too small could cause blockage. One that's too large would not be cost-effective.

Ericsson has *world-wide* experience in telephone, radio *and* cellular technology. We can tell you *all* options, their short- and long-term impact. And tailor-make the system to suit your needs.

2. Are there any hidden costs—will my system become obsolete?

With some systems, to add a new function, you need an entire new software *generic*. To add new subscribers, you have to add new switches. And to make technological improvements, change the *configuration* of your system.

With the Ericsson AXE 10 switch, you can add one function at a time—at a fraction of the cost of a new generic. Add up to 250,000 subscribers—on the same switch. And upgrade just one module of hardware—without touching the software or any other part of the system.

3. Will the system be cost-effective with 2,000 or 250,000 subscribers?

Most systems *aren't*.

Because of its modularity, the AXE 10 allows you to *stay* cost-efficient—with any number of subscribers.

4. What's your experience in the telephone business?

Ericsson started in the telephone business over a hundred years ago.

Where some people are now building their *first* switch, we're on our *second generation* SPC switch (Stored Program Controlled)—the most advanced in the world.

5. What kind of quality control do you have?

Most people spot-test microcircuits. We test *every one*—four different ways.

Other companies use plastic encapsulation for components. We use ceramic—for a better hermetic seal and higher reliability.

Just two examples of why our equipment is the best—bar none.

6. Do you use a commercial processor?

With commercial processors, you lose efficiency, have capabilities you don't need. And use languages which aren't best suited for telephone functions.

Ericsson designs and builds its *own* processors—extremely functional, with a high level of efficiency.

7. Can your processor handle all "busy hour call attempts"?

Some processors will literally "freeze up" in emergency situations. The AXE 10's processor *can't*.

8. Suppose I have a fault?

In most systems but Ericsson's, one fault could cause *cascading* faults and "freeze" the entire system.

The AXE 10 is virtually *immune* to cascading faults. All software functions and all hardware blocks are separate, and kept isolated from each other.

9. How much downtime, maintenance, and day-to-day administration can I expect?

Most systems "dump" raw data into a teletype. Solution? Hire a technician to analyze it. Or buy a special processor to monitor the system.

The Ericsson AXE 10 has *internal diagnostics*. It corrects some problems. Puts others on a maintenance list. And notifies you if service falls below the level *you* specify.

10. Suppose something goes wrong, whom do I call?

Ericsson *manufactures* both telephone *and* radio equipment so should you ever have a problem with our equipment—you *know* whom to call.

And to give you the best service possible, we have a special support center in Richardson, Texas.

11. What experience do you have in radio?

Ericsson has been in the radio business for over 60 years. And we're one of the world's leading manufacturers of *mobile* radios.

12. What experience do you have in *cellular* telephony?

The proof of the pudding.

Ericsson has been involved in developing cellular systems since 1970.

We were the major supplier for the largest cellular system in the world—the Nordic System (now, over 70,000 subscribers). And have installed other systems in Saudi Arabia, Spain, and the Netherlands.

Now that you've read *our* answers to these crucial questions, we recommend you ask our competitors the same questions.

Before you sign on the dotted line.

If you'd like to know more about the Ericsson system, call Mats Ljunggren at (201) 460-8030. Or write: Ericsson Communications/ Radio Systems, 1290 Wall Street West, Lyndhurst, N.J. 07071.

ERICSSON

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IN THE NATION'S CAPITAL

VICTOR BLOCK, Washington Editor

FCC modifies its policy on U.S. earth stations

The Federal Communications Commission (FCC) has modified its policy on ownership and operation of U.S. earth stations linked with the International Telecommunications Satellite Organization's (INTELSAT) global communications satellite system to allow them to be owned and operated by individual carriers (CC Docket 82-540).

This amends the previous policy under which U.S.-based international earth stations have been owned by a consortium of carriers including the Communications Satellite Corp. (COMSAT), and American Telephone & Telegraph Co. and other U.S. international service carriers. COMSAT through its World Systems Div. owns 50%, with the remaining 50% divided among the international carriers.

The FCC noted that the present ownership policy was established in 1966 when INTELSAT was not yet operational, satellite policy was just being developed and the primary policy consideration was establishment of a global system. In that environment, the commission said, it was reasonable to give COMSAT a dominant role in any earth station ownership plan. Since then, the FCC continued, the evolution of COMSAT has provided an opportunity to change from a conservative policy to one stressing benefits to users, while still recognizing its commitment to INTELSAT.

The commission said a liberalized earth station ownership policy will benefit users by increasing carrier and service options and creating competitive pressure on rates. It said such a policy is consistent with INTELSAT obligations, as well as statutory objectives for existing earth stations and can be implemented without adverse impact on service quality or efficiency.

Under the new policy spelled out by the FCC:

- INTELSAT Business Service and television earth station applications will be accepted from any carrier and processed on a streamlined, routine basis;
- multi-purpose earth station applications will be subject to a more rigorous review of economical, technical and operational considerations; and
- the existing earth station joint owners will negotiate among themselves the future of their respective investments.

The FCC has directed COMSAT to separate its earth station activities from its space segment activities, and to file an application to transfer ownership interest in authorized international earth stations from the World Systems Div. to a separate common carrier subsidiary by Feb. 1, 1985. It also directed COMSAT to file unbundled cost-based tariffs for INTELSAT space segment through the division and earth station tariffs through a separate subsidiary acting as an international carrier next Feb. 1, to become effective on 45 days notice.

Greene stands behind divestiture decision

U.S. District Judge Harold H. Greene says he continues to believe the American Telephone & Telegraph Co. (AT&T) divestiture was a good idea that will benefit most customers, and that complaints about poor service and equipment problems have been exaggerated. He also continues to hold the opinion that restraints are necessary on diversification by the Bell regional holding companies.

Greene is quoted in a Washington Post interview as saying that he believes that the break-up of AT&T had become inevitable—by legislation or Federal Communications Commission action, if not through antitrust court proceedings. Among benefits, he says are a wider choice of equipment and services for the public and lower long distance rates resulting from competition.

While saying he does not wish "to minimize the complaints that people have" about service, equipment and confusing choices among available alternatives, Greene adds that people who emphasize problems they are facing are overlooking the benefits of divestiture. Among these he includes the ability to obtain a telephone "much more cheaply than you could when AT&T had a monopoly" and only rentals were available.

Questioning complaints about broken equipment, he says his experience is that telephones "don't break that easily." And when they do, he continues, people have little trouble finding out where to have repairs made.

Greene is sticking to his guns with regard to restrictions on entry by the regional holding companies into non-regulated activities not directly related to telecommunications. Stressing the goal of continuing to provide reliable basic service at reasonable rates, he says allowing the operating companies to undertake "more exotic ventures" could lead to telephone service becoming "a backwater" that fails to attract "the attention and capital" it should.

Four DBS applicants get interim OK

The Federal Communications Commission (FCC) has acted favorably on four second-round applications for authority to construct interim direct broadcast satellite (DBS) systems. It granted the applications of Hughes Communications Galaxy, Inc., a Hughes Aircraft Co. subsidiary, to provide service from two satellites—each designed to deliver 16 channels to half the continental United States (half-CONUS)—and of Advanced Communications Corp., National Christian Network and Satellite Syndicated Systems, Inc., to provide service from two satellites, each of which is to deliver six channels to half-CONUS.

The grants do not include launch or operational authority, do not assign frequencies or orbital positions for any satellite and specify that the applicants must begin system construction "with due diligence" as defined in the commission's rules.

The FCC said orbital positions and channels will be assigned to each permittee after it has demonstrated compliance with the initial phase of the due diligence requirement, on a first-come, first-served basis. The commission added that it will process additional DBS applications after 6 months, until a mutually exclusive situation arises, on the same basis.

The commission in the same order gave National Exchange, Inc. and Satellite Development Trust 45 days to amend their applications to conform with FCC concerns over certain proposed technical specifications. It also returned as incomplete and unacceptable for filing the application of Space Communications Service.

Air-ground service gets a reprieve

Acting on the day it was scheduled to expire, the Federal Communications Commission (FCC) has granted a 1-year renewal of an authorization to Airfone, Inc. to continue providing air-ground radiotelephone service on an experimental basis. The commission earlier had decided not to allocate available frequency space on a permanent basis for the service (Gen. Docket 83-30).

The notification by the FCC's office of science and technology gives Airfone a go-ahead to continue operating its stations for 1 year—a move that prompted Jack Goeken, president of the company, to voice relief. He said the change of heart by the commission "is going to give us

Continued on page 21

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All we need from you is your billing data each month . . . and we'll even help you gather that.

Fast, concise billing

With CABS, your bills go out complete and on-time every month, just like clockwork.

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Penny per message processing

The cost of CABS service from Bank of Illinois is just a penny per message processed.*

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CABS Software: The billing system you can buy.

CABS is also available as software compatible with IBM mainframe computers.

Like CABS service, CABS software features easy data entry through on-line CICS programs, table-driven tariff and COBOL language.

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Continued from page 16

enough time to show that there is a real public need and benefit for this service" (TELEPHONY, Dec. 3, p. 16).

Washington Round-Up

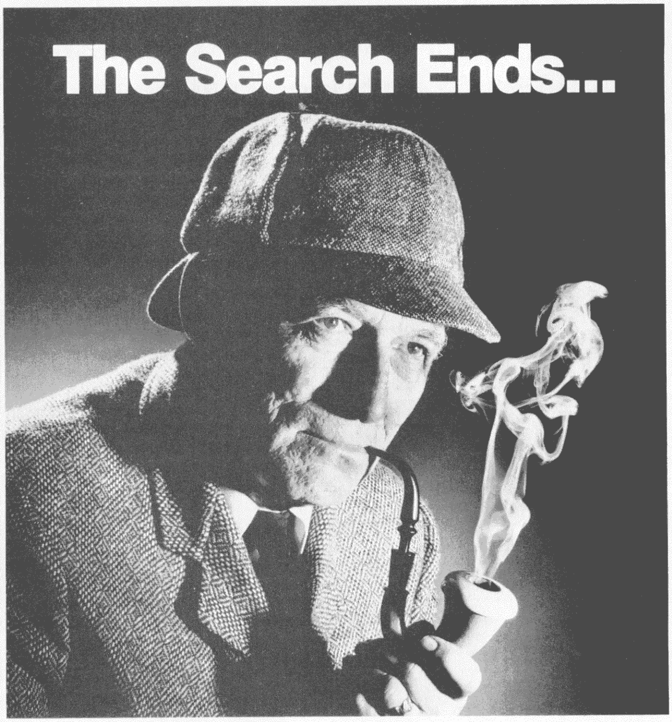
Pay phone plea. The FCC has been asked to rule that specified state regulations and local carrier tariffs governing the interconnection of customer-provided coin telephones to the network are unlawful and invalid under commission decisions. The petition for a declaratory ruling filed by the Universal Payphone Corp. refers specifically to state regulatory decisons in Arizona and Minnesota. The FCC has called for comments on the petition by Jan. 7, 1985, and for replies on or before Jan. 21. For further information about the proceeding, contact Patrick Donovan of the FCC staff at (202) 634-1832.

Waiver for Ameritech. . . The Ameritech operating companies have asked the DOJ to back their request for a waiver from the AT&T consent decree judgment allowing them to offer non-tariffed billing services to domestic communications providers. The companies seek to provide monthly invoices to customers, without indication "of any connection with Ameritech or its affiliates." Ameritech said it has discovered a need for improved billing services through provision by its operating companies since last January to various interexchange carriers.

. . .and Northwestern Bell. The FCC is seeking comments on a filing by Northwestern Bell for approval of supplements to its capitalization plans for its Computer II subsidiary for it and other vendors to sell telephone company services on a commission basis. The company asked for interim approval of the sales agency program so its subsidiary may begin selling network services as soon as at least five non-affiliated sales agents have been designated. The telco filed the request following action by the FCC granting the Ameritech, BellSouth and Nynex operating companies partial waivers of the prohibitions against joint marketing by former Bell operating entities and their Computer II subsidiaries through sales agency programs. The commission has called for comments on the request by Dec. 21, with reply comments due by Jan. 4, 1985.

United Telecom report. NARUC has published a report, *United Telecommunications, Inc. Data on Manufacturing, Supply and Service Affiliates for 1983.* The 59-page report contains a description of United Telecom and its subsidiaries; outlines the company's income statements and balance sheets; provides information on its stock transactions and accounting policies, and includes data on United Telephone System, Inc. Copies of the report may be obtained from NARUC, P.O. Box 684, Washington, D.C. 20044 for $5.50 (plus 6% sales tax for District of Columbia purchasers), with no postage charge if payment accompanies the order.

Hearing aid compatible phones. The FCC has issued a public notice intended to remind parties of their responsibilities and rights under the Telecommunications for the Disabled Act of 1982, under which the commission published implementing regulations early this year. Those rules established standardized specifications for determining whether a telephone is hearing aid compatible, enumerate locations where compatible telephones must be available and require that telephone packaging be labeled or otherwise inform consumers of hearing aid compatibility requirements. Congress in the law delegated to state regulatory commissions responsibility to enforce requirements which take effect Jan. 1, 1985 that telephones at certain locations be compatible. The FCC's notice is intended to inform those with a responsibility to maintain hearing aid compatible phones at specified locations, make sure state regulatory officials are aware of their enforcement responsibilities, call the attention of manufacturers and retailers of telephones to their duties concerning telephone package labeling and inform consumers of their rights. Further information is available by calling Carl Gold at (202) 632-4887 or Jacqueline Holmes at (202) 632-4890.



Continued from page 13

"about $700 million (U.S.)," more than double last year's $340 million, which was more than double the 1982 figure.

He spoke at the headquarters of the Canadian company's rapidly expanding U.S. subsidiary—Northern Telecom, Inc.—in Raleigh, N.C., where the company had gathered about 125 security analysts from the U.S. and Canada for a conference Nov. 27-28. He was one of about a dozen Northern Telecom executives whose presentations gave a composite picture of burgeoning sales and high future promise for the company.

Fitzgerald teamed with Donald A. Noble, executive vice president/finance & administration of the Canadian parent company, for the opening presentation, which was the piece de resistance of the conference. Fitzgerald recounted the company's initial thrust into the U.S. market in 1971, when it established the U.S. subsidiary and its first U.S. manufacturing plant.

That year revenues from the U.S. operations amounted to about $35 million (Canadian) and represented about 7% of Northern's consolidated revenues. This year, in contrast, revenues from U.S. operations represent about 62% of North-

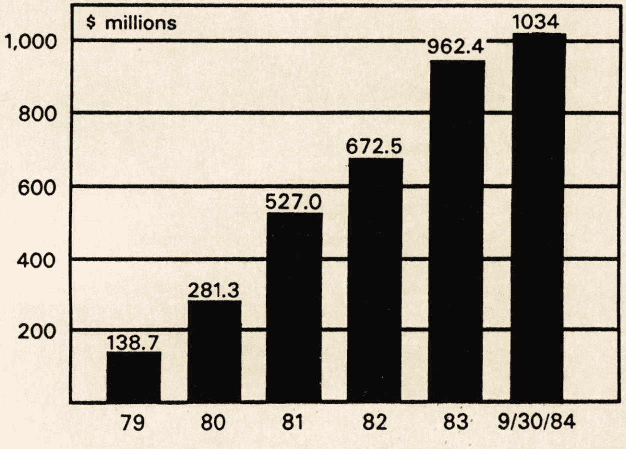
Continued on page 24

Northern Telecom Limited U.S. Revenues (millions)

	C$	US$
1984 (9 months)	1,835.7	1,423.5
1983	1,856.1	1,505.6
1982	1,462.2	1,186.5
1981	1,052.1	878.5
1980	793.7	675.3
1979	754.4	644.9
1978	426.8	374.1
1977	197.2	186.8
1976	114.5	114.4
1975	91.9	90.6
1974	102.2	104.7

Table shows acceleration of Northern Telecom's U.S. revenues from 1974 to 1984 in Canadian and U.S. dollars.

DMS Switching Revenues



Northern's biggest revenue producer has been their DMS digital central office switching line. Chart shows consolidated DMS revenues for the entire company in Canadian dollars.


1025SK
1025SK
Ditch Witch

Continued from page 22

ern's consolidated revenues, or $2.6 billion (Canadian), Fitzgerald said. He added that the company now has 14 manufacturing plants and 15 research and development laboratories and employs about 19,000 people—up 20% over last year—in the U.S.

Looking ahead to 1985, the Northern Telecom president said the aim is to achieve 20% to 25% growth in consolidated revenues and net earnings per common share. He added, "It is obvious that central office switching should again lead the way as our strongest revenue growth area."

Noble provided closer perspective on the recent performance of the company's various product lines. For 1984, he said, central office switching will likely be up 55% to 60% over last year, representing more than 40% of consolidated revenues; in 1983 it was 36% of consolidated revenues. The business communications systems segment, he said, is likely to rank second in growth this year, with revenues up 37% for the first nine months of 1984 compared with the same period in 1983.

Sales of transmission equipment and of terminal equipment each should produce a 5% to 10% increase in revenues for 1984 over last year, he said.

In a question-and-answer period, Fitzgerald was asked how long he expected the kind of growth Northern has been experiencing in central office equipment to continue. He replied that it "can't be expected go on forever," and looking toward the day that it will level off, Northern is making strong plans to move into the international market with particular emphasis upon the United Kingdom and Japan.

Fitzgerald said he expected Northern's DMS digital switch "will be a stalking horse at British Telecom, and also probably with Nippon Telegraph & Telephone when that system goes private next spring."

Cincinnati Bell promotes four execs

Cincinnati Bell Inc. has announced several executive promotions which will take effect Jan. 1.

President Dwight H. Hibbard also has been elected chairman and chief executive officer of the corporation and its largest subsidiary, Cincinnati Bell Telephone. Dennis J. Sullivan Jr., executive vice president of Cincinnati Bell Inc., has been named president and chief operating officer of the telephone company.

Raymond R. Clark, president of Cincinnati Bell Enterprises, and John T. LaMacchia, president of Cincinnati Bell Information Systems, also were elected vice presidents of the parent organization, Cincinnati Bell Inc.

Anixter to distribute TIE gear in Canada

Anixter Communications Canada will distribute a selection of telephone products from TIE/communications Canada, Inc.

Among the products to be distributed are the Smart Set, the Econ-o-key, the Homefone and the Businesscom 308 and 516.

Anixter Communications Canada, a unit of Anixter Bros., Inc., Skokie, Ill., supplies equipment to the cable television and telephone industry in Canada.

SBS Skyline offers universal travel access

Subscribers to the SBS Skyline Long Distance travel feature were able to make interstate telephone calls between any two points in the 48 contiguous United States as of Nov. 15. Puerto Rico, U.S. Virgin Islands and all major metropolitan areas of Canada can also be reached with this network.

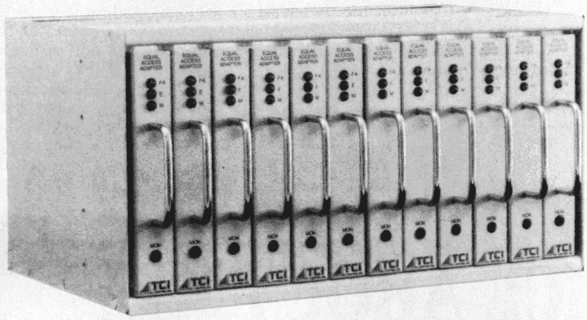
SBS is based in McLean, Va.

AT&T-IS inks agreement with United Technologies

AT&T Information Systems (AT&T-IS) and United Technologies Building Sys-

Continued on page 26

☆☆☆☆ NOW ☆☆☆☆
EQUAL ACCESS FOR ANY C.O.



Let TCI Solve your equal access problems with our new Equal Access Adapters. TCI's new Equal Access Adapter will allow any C.O. to have equal access capability, from the class 5 originating office to the Inter-exchange Carrier. This can be accomplished without costly modification to your existing equipment. The TCI Equal Access Adapter wires between the carrier facility and the outgoing/incoming E & M trunks. Each circuit has its own "on board" processor, MF receiver, and MF sender. Twelve (12) position cage mounts in standard 19, 23, or 27 inch relay rack.

* Receives calling/called numbers in TSPS format.

* Called number can be received DP or MF from the originating office.

* Looks up calling number and adds class mark to identify which Inter-exchange carrier the subscriber has chosen or sends routing information before the calling/called numbers.

* If 1 0 XXX has been dialed, the class mark of that inter-exchange carrier will be sent automatically.

* Remote administration allows changes to be made from a centralized location.

* Sends Feature Group "D" and routing information when required.

** Converts Feature Group "D" format to any format your equipment requires.

** Ensures correct amount of digits before sending an acknowledgement wink.

** Add or delete area code of calling number if required.

** Verify all subscriber numbers before forwarding calls.

** Convert ANI numbers to PIN numbers if required.

(*Originating office)
(**Inter-exchange carrier)
See us in New Orleans, Booth 3048

TCI
TEL CONTROL,INC.

P.O. Box 4031
HUNTSVILLE, AL 35815-4031
PHONE (205) 881-4000

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Continued from page 24

tems Co. have formed a partnership to market and provide shared information services to tenants, owners or developers, and managers of multi-tenant commercial buildings.

The partnership is known as ShareTech and was formed by subsidiaries of both companies. It will be located in Parsippany, N.J., and will be comprised initially of approximately 170 employes from AT&T-IS and United Technologies Building Systems.

ShareTech will own the common equipment, processors and terminals in the buildings in which service is provided. Tenants will pay monthly charges for the services which will include the use of terminal equipment, common equipment and software for their internal and external communications and information processing needs. Additional services will include customer training, consulting services and on-site staff support.

Honeywell announces Synertek layoffs

Honeywell Inc. is laying off 1000 employes at its merchant semiconductor subsidiary, Synertek Inc., and also is planning to sell the business.

The layoff affects the majority of the subsidiary's 1200 U.S. workers at facilities in Santa Clara and Santa Cruz in California. Employes will receive separation pay through Dec. 31 and additional benefits will be paid according to length of service.

The company also is laying off a substantial number of its 500 employes in Singapore. There will be no layoffs at the Synertek facility in Bangkok, Thailand, where packaging and subcontract work will be handled while the business is being offered for sale. The company's design center in Munich, West Germany, also will not be affected.

Honeywell acquired Synertek from private investors in 1978. In 1982 the company's major market, integrated circuits for consumer electronics, declined severely. The company also had little success in penetrating high-performance industrial markets.

Eagle Plains Hotel to add SED Skyswitch

The Eagle Plains Hotel, located just south of the Arctic Circle in the Yukon, will be the first location to install a two-way satellite communications system called Skyswitch.

The system, designed, manufactured and marketed by SED Systems, Saskatoon, Saskatchewan, connects with the office telephone to provide voice and data satellite communications for private networks. The first system will link McNevin Construction Ltd. of Saskatoon with their hotel complex at Eagle Plains.

The Eagle Plains Hotel serves as the communications center for oil exploration crews, pilots, truckers, trappers and prospectors. Facilities for the highway crew are built into the hotel complex which also houses the area's emergency center.

The hotel is currently served by radiotelephone linked to the telephone system in Fort Nelson, British Columbia, by approximately 20 radiotelephone stations.

The terminals for the new system are scheduled for installation in the spring of 1985. The master unit will be located at Saskatoon with the remote terminal located at the hotel. Additional remote units can be added if necessary. The initial system will use a single voice channel but can be expanded to as many as 64 channels if necessary.

Tele-Engineering completes FO project

Tele-Engineering Corp. has completed the installation of fiber optic cable for Computervision Corp.

The installation was the second phase of a project that interconnects telephone switching equipment in five locations at the company's headquarters in Bedford, Mass. The value of the contract was not disclosed. Tele-Engineering, Boston, provides cable, and microwave systems, services and products.

From now on LOCKBAR™ Fastening will make the difference in how you judge splice cases

LOCKBAR Fastening now makes the best splice case available even better. That's because this revolutionary new fastening system eliminates the need to individually assemble nuts and bolts to close the PREFORMED Splice Case.

The LOCKBAR System consists of front and back bars that fit into the Splice Case flange. The back bar has factory assembled bolts and nuts. The front bar has keyholes that accept the bolt assemblies on the back bar. Once the bars mate through the flange, it's simply a matter of locking the nuts into the keyhole and tightening them down in sets.

LOCKBAR Fastening does not alter Splice Case dimensions or benefits. It does not alter previous catalog numbers.

Other PREFORMED Splice Case Benefits Remain Unchanged

- For normal use overhead, underground; with carrier systems, fiber optics, as a vault closure or a building closure.
- Strong and dependable regardless of environmental extremes.
- LOCK-Tape™ Sealing develops a gasket-like seal that provides strong cable pull-out strength and keeps air in and water out.
- Easily applied and re-entered without a special kit.
- Available with a variety of end plates and in various sizes including a new 45" Super Stretch length.
- Ask for the free "How to Judge a Splice Case" brochure and judge for yourself: PREFORMED LINE PRODUCTS, P.O. Box 91129, Cleveland, Ohio 44101, (216) 461-5200.

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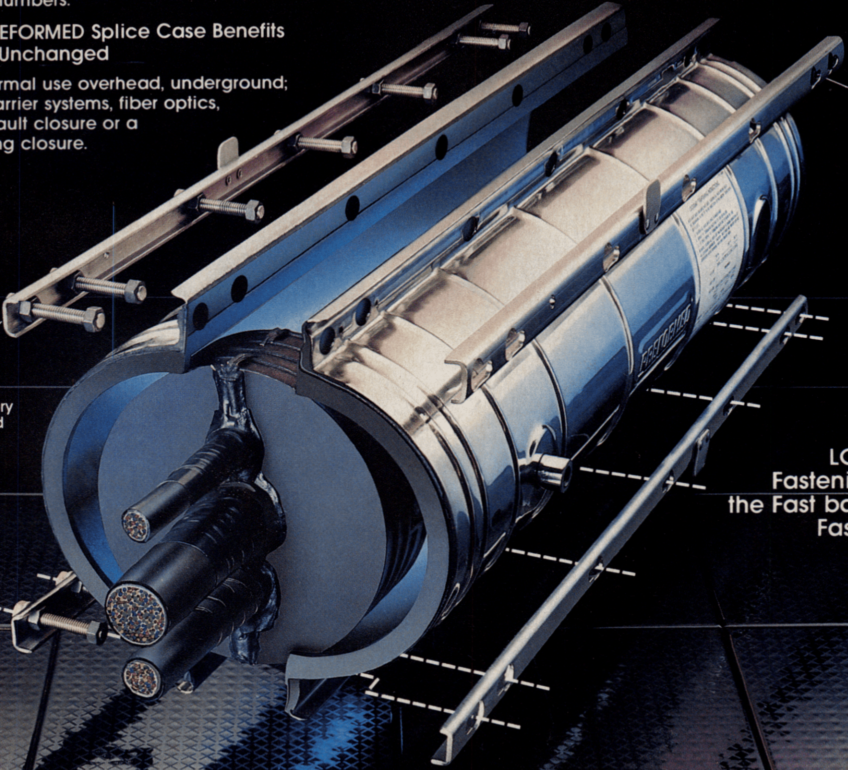

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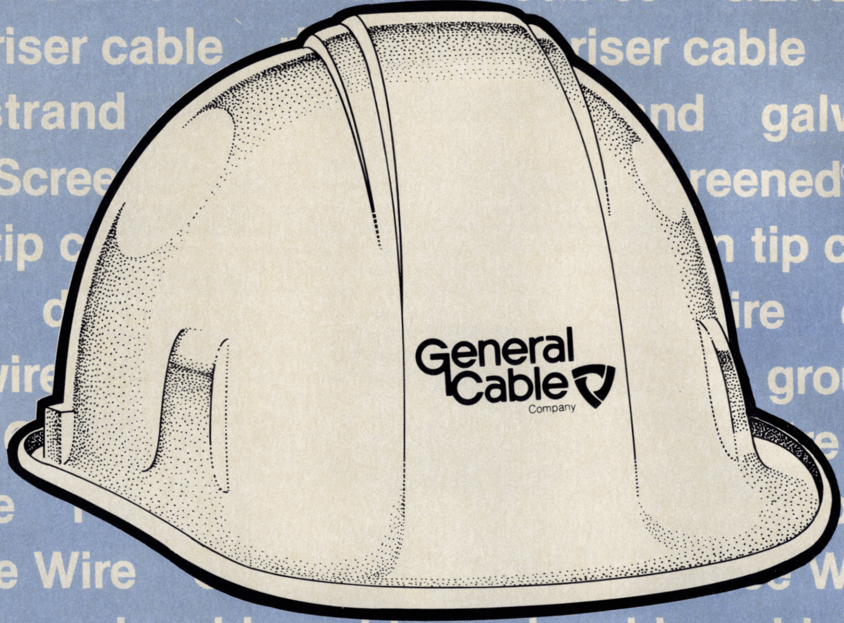
We make the difference.


General
Cable
Company

telephony
THE JOURNAL OF TELECOMMUNICATIONS SINCE 1901

A call is a call is a call. . . .

AS WE SEE IT

ON THE rough road leading toward cost-based prices, the telecommunications industry cannot escape the heat of customer wrath nor always disclaim responsibility for generating some of it. The term *access charge*, for example, backfired and delayed the very remedy that many industry leaders desire. Now, the term is fading in favor of other terms supposedly more palatable to customers.

But a new term, *dial tone charge*, is waiting in the wings.

At least one company, Chesapeake & Potomac Telephone Co., hopes to sell dial tone in West Virginia. The cost of providing dial tone is a separate part of a local measured service (LMS) plan currently before the state's Public Service Commission. If the plan is approved, every customer will pay a fixed monthly charge for dial tone and pay additionally for one of several optional calling plans.

For the record, we as consumers favor LMS. TELEPHONY has publicized LMS extensively and will continue to do so for as long as the subject interests the industry. Moreover, we live and work in Illinois Bell's Chicago territory where LMS long has been established.

But we don't buy dial tone. If Illinois Bell tried to sell it, Chicago consumers would tell the company exactly where to put it or, possibly, opt for service without dial tone. Illinois Bell, however, offers a neat, reasonably understandable series of separately charged Call-Paks plus a monthly service charge. It seems equitable and makes sense.

Selling dial tone does not make sense. It's like asking for an admission fee at the door of the supermarket, the ploy of a few cut-rate establishments that flit like moths through the retail scene.

Most merchants understand that customers come to them to buy merchandise. And the butchers of this world are too smart to separately ring up the cost of gristle for the customer who is buying steak.

As we see it, dial tone, ringback tone, busy tone and the like are telecommunications "gristle" that customers won't buy. They come to carriers to make calls—local calls, long distance calls, custom calls, data calls, video calls. . . .And they will pay for calls, although they sometimes will want to haggle over the price.

But they won't forget that a call is a call is a call. And carriers who forget do so at their own peril. □


1
ABC 2
DEF 3
GHI 4
JKL 5
MNO 6
PRS 7
TUV 8
WXY 9
*
OPER 0
#

DCRIS: operating in today's paperless environment

```
COMMAND                            FUNCTION
ADJ...............CLAIMS AND ADJUSTMENTS
AUTO...............AUTOMATIC ASSIGNMENT
CASH.....................CASH COLLECTION
CREDIT............CUSTOMER CREDIT HISTORY
DIRECT..........................DIRECTORY
DISP.......DISPATCHING OF SERVICE ORDERS
EQMENU.........PLANT RECORDS PROCESSING
INQ.......................BILLING INQUIRY
ORDER.........SERVICE ORDER PROCESSING
SUPER...SUPERVISOR ASSISTANCE AND CONTROL
TREAT..........................TREATMENT
TROUBLE.......TROUBLE REPORT PROCESSING
```

Contel photo by Richard Martz and Steven J. Swieter

All of Contel's records, paper forms and miscellaneous documents have been gathered into one interactive database, which coupled with the appropriate hardware, is known as a Distributed Customer Records Information System.

ED HAZELWOOD

THE TELEPHONE Operations Group of Continental Telecom, Inc. (Contel), Atlanta, serves more than 2 million customers in 37 states. Its far flung service areas include sparsely populated rural areas, small towns and rapidly growing urban areas.

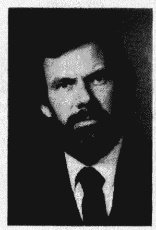
The variety of its service areas, along with the rapidly changing technology of the telecommunications industry, increased competition and ever increasing customer demands for new service, features and capabilities made Contel aware of the need for a better method of record keeping and paper handling. A system was needed that would not only meet customer needs and company requirements, but improve record accuracy and personnel productivity.

Contel decided that the most efficient way to meet this need was to identify and capture all records, paper forms and miscellaneous documents necessary for daily business office and service center operation in one interactive database.

This database, coupled with the appropriate hardware, would become a Distributed Customer Records Information System (DCRIS) enabling Contel to establish the service office of tomorrow. Information would be available to perform discrete business office and service center functions.

Business office functions would include cash collection, treatment, billing inquiries, manual and automatic billing adjustments, and service order processing. Service center functions would include: service order processing, automatic assignment of central office equipment, automatic assignment of outside plant equipment and mechanized trouble reporting.

A computer oriented system like DCRIS requires a great deal of planning. By acquiring a complete understanding of the activities of the service representatives, cashiers, line assigners, test/dispatchers, and trouble repair clerks, and basing all decisions on their needs, Contel was



THE AUTHOR
Ed Hazelwood is Design & Conversion Analyst-DCRIS for Contel Service Corp., Atlanta, a unit of Continental Telecom, Inc.

> **'To make the system as user friendly as possible, either a training mode or a production mode may be used. The training mode provides prompting information to assist the user through an unfamiliar function.'**

able to configure the system to yield maximum benefits. Most importantly, the system eliminates the need for duplicate records and provides for instant updating of all related records in the database. Additionally, by enforcing standards in equipment item identification, the data capture methods eliminate record inconsistencies and provide a means of security control for the record entries.

Users interact with the system through terminals and are restricted to specific transactions by means of:

- user identification (ID) numbers;
- user passwords;
- transaction processes;
- validation processes; and
- privilege levels.

The sign-on procedure includes identification of the user to the system. The user is identified both by the user ID and the user password. Any function can be performed as long as the user knows the equipment entry format and is authorized to perform the specific function. However, the supervisor may impose restrictions on a user by privilege level, business office, work force or number of transactions allowed.

To make the system as user friendly as possible, either a training mode or a production mode may be used. The training mode provides prompting information to assist the user through an unfamiliar function. Once familiar with the function, the user can bypass the training instruction screens.

The system currently runs on Honeywell DPS-6/76 minicomputers. A typical database contains records for approximately 50,000 customer accounts. Communications between user terminals at the service office sites and a centrally located DPS-6/76 minicomputer are transmitted over the Contel network using the standard X.25 protocol. The network is capable of operating at either 9.6 kilobits per second (kb/s) or 56 kb/s, and links all 13 host sites to service offices and Contel's three Regional Data Centers to each other.

The existing network stretches from Minnesota to Texas, and from Maine to California. It was designed with Contel's future needs in mind and can easily handle several million packets of data per month. The terminals in the local offices communicate with the host computers through Model 120 statistical multiplexers from Digital Communications Associates (DCA) connected to DCA 355 network processors and Northern Telecom SL-10 packet switches.

Record conversion

The conversion from the paper system to the totally mechanized system was accomplished in a step by step, or building, process.

Business office, service center, outside plant records and other source documents are captured by various data capture programs, and loaded into the database in three distinct phases (Table 1).

Since Phase I information is the foundation of the database, it is essential that the paper records and all source documents used to load the database be corrected before the conversion.

Database input comes in part from the billing system. Contel obtained existing information from the Regional Data Center that was used to load the database, as well as the data and reports used to check information prior to loading. A telephone good-number listing and a directory name listing provided much of the information.

The line/number card information for Phase II is captured by microfilming the cards in the service office and then keying the information onto magnetic tape. This process is performed by one of Contel's contractors, whose keying personnel are furnished guidelines for each office and make many entries automatically. This saves many hours of manual entries that would otherwise be required of local office personnel. Once the line/number card data is loaded into the system, the entire rotary or tub file can be removed from the service office, freeing floor space for other use.

The information loaded in Phase III enhances the information previously loaded in Phase II by providing more detail for carrier systems, cross connect boxes, remote switches, and local or isolated cable and pair information. It also includes the serving terminal locations for the customer premises served and de-

Table 1
Records converted and loaded into DCRIS for each phase

Phase I

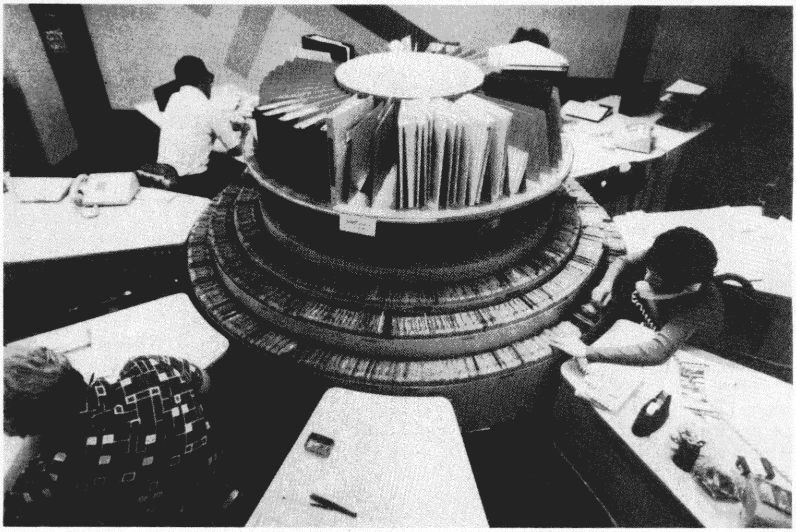
1. Business office identification
2. Central office identification
3. Telephone numbers (by thousands group)
4. Billing exchange numbers
5. Map tags
6. Truck tags
7. Work force identification
8. Directory name listings

Phase II

1. Line equipment items
2. Classes of service
3. Telephone numbers (by hundreds group)
4. Switch features
5. Line treatment types
6. Subscriber carrier systems
7. Cable pair main frame terminations
8. Auxiliary equipment
9. Line/number card information
10. Left-in facilities records

Phase III

1. Serving terminal details
2. Cross connect boxes
3. Subscriber carrier systems
4. Centralized carrier systems
5. Carrier concentrator systems
6. Remote switches
7. Cable leads
8. Local and isolated cables



The line/number card rotary or "tub" file is a thing of the past with the new system.

tailed information regarding the serving terminal.

Functions, capabilities

Phase I has seven functions and capabilities.

Service orders. Phase I provides for on-line entry, modification, assignment, dispatch and completion of all types of service orders, with edits at every step to assure entries are accurate. To save keystrokes, only minimum information entry is required for all order processes, and default values are provided for many routine entries. The system also maintains control of telephone numbers and information about all pending orders, including held orders. This information can be accessed by many parameters, such as associated job orders or the reason for held order status, including those held for customer action. Data regarding completed order activity is retained for a minimum of 30 days, but it can be retained longer when necessary.

Work load. The system monitors work load by work units assigned to each work group, and allows daily scheduling of order activity up to an established limit. However, supervisors have the ability to provide this limit on a day-to-day or order-by-order basis.

Customer billing. Customer billing is rendered on the basis of transmitted DCRIS service orders and toll calls processed at the billing center. Even though all billing is done at one of the regional centers, order activity is current within 1 to 3 days. The system provides an on-line display of the customer's current and prior bills, and can initiate toll adjustments that automatically compute tax, credit the customer, print out a report for toll investigation and generate an adjustment approval form.

Customer directory listing. Users can display the customer's current directory listing, as well as the type of service and equipment.

Credit history. The system can display active or inactive credit history and permits on-line modification. Inactive credit history is normally retained for 1 year, but longer or shorter retention periods are possible.

Account payments. Final account payments are displayed and the system maintains a register of all treated accounts with instantaneous updating of all payments and adjustments entered in the service office. The register is updated daily with other payments processed at the regional data center.

Temporary disconnects. When a customer is temporarily disconnected, that fact is shown on the credit history display, the directory display, on the treated account register, and on the customer's plant circuit display.

Phase II has six essential functions and capabilities.

Automatic equipment selection and assignment. The system can automatically select equipment for assignment to R1 and B1 classes of service. The service representative initiates automatic assignment at the completion of service order initiation. The system selects the telephone number to give to the customer and searches for left-in-place facilities by premises ID. The line assigner initiates automatic assignment in cases where it has not been completed by the service representative.

Semi-automatic assignment. The semi-automatic process is initiated when left-in-place facilities are not available for automatic assignment. After entering the equipment identifier, the system will select the next available item.

Switch and load balance. Phase II incorporates switch load and balance algorithms for telephone number hundreds groups and line equipment groups.

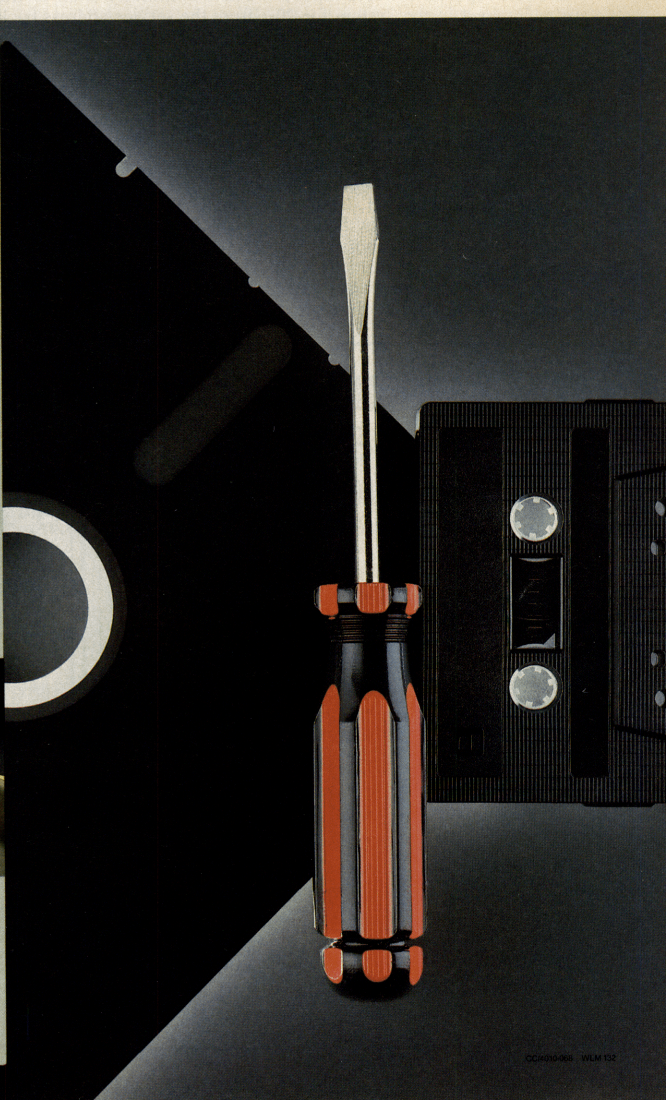
Trouble reporting. The trouble reporting process completely replaces

Continued on page 36

'The conversion from the paper system to the totally mechanized system was accomplished in a step by step, or building, process.'

SIEMENS

Upgrading our PABX systems is as easy as profiting from them.



Upgrading Siemens SD PABX systems is as easy as changing a cassette or floppy disk. Your customers will flip over the convenience... and you'll get the profits!

But simple software enhancement is just one of the many benefits of our microprocessor-controlled SD-192, SD-232, and memory expanded SD-192MX systems. There's also a reliability record that is legendary within the industry. In fact, 10,000 profit-building SD systems have been installed, totaling more than one million lines! This field-proven dependability contributes to your bottom line... and your customers satisfaction.

We've recently released several features and have additional enhancements scheduled for this year. What's more, we've also introduced a new line of advanced desk-top executive telephones that give your customers easy access to the SD systems' full feature complement. It's another example of our on-going commitment to improving your sales efforts. And it's just what you'd expect from Siemens, the world's largest supplier of PABX equipment. For more information, complete the attached postpaid reply card. Or call toll-free: 1-800-327-6636. (In Florida, Alaska, or Hawaii 305-994-8100.)

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Office Systems Group
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Boca Raton, FL 33431

The new SET-30E executive telephone gives your customers single-button access to our SD systems' full feature complement.

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Innovations in telecommunications for over a century.

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CC/4010-068 WLM 132

the paper trouble ticket now used in today's service office. It provides advantages in the method of initiating, testing, dispatching and completing trouble reports, including:

- Automatic identification of subsequent reports.
- Automatic final-clearing of subsequent reports.
- Prevention of duplicate dispatches on the same report; only the original report is dispatched. If a report must be dispatched to more than one employe, a record on each dispatch is automatically maintained.
- Automatic calculation and entry of total accumulated job time.

Trouble reports. Trouble reports are maintained in the system for 20 days. After the 20-day period, trouble history is transferred to microfiche. However, certain information is retained from the five most recently completed trouble reports.

Other reports. Many reports needed for the service office operation can be computer generated from the Phase I and Phase II database. This capability saves many hours of valuable time, because formerly the reports were compiled manually. The reports available include: rack sheets, temporary disconnect for non-payment, user statistics report, line and number report, party line fill report, equipment availability report, work order report, customer trouble history (microfiche); telephone number ordering report and line equipment ordering report.

Phase III has three basic functions and capabilities.

Automatic plant assignment. The system automatically assigns inside and outside plant equipment to service orders. Initiation of the automatic assignment function starts a locator process which searches for existing equipment or circuits already associated with a service address. Plant continuity then is traceable from the service address back to the central office or to other originating equipment.

Outside plant displays. Many outside plant displays are available, such as serving terminals and status information for cables and pairs.

Reports. The Phase III database will be capable of generating a number of additional reports related to inside and outside plant facilities.

Current status

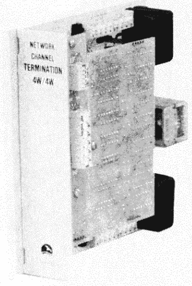
Phase I has been in production use in Contel's New York Div. since August 1981 and is scheduled for complete implementation throughout the Contel system in 1984.

Phase II is operational at Contel's Norwich, N.Y., test site, and is scheduled for systemwide implementation beginning in 1985.

Phase III is currently under development and is scheduled for installation at a test site during the second quarter of 1985. Systemwide implementation is scheduled for 1985 and 1986.

The first two phases already have proven the benefits to be derived from having one complete computerized system for the service office operation. Phase III will enhance these benefits through additional productivity and efficiencies. The system will be a complete, operations oriented, user friendly system at the heart of the service office of tomorrow. It should meet Contel's and its customers' needs for many years to come.

The system also can be applied to non-telephone oriented businesses. In many cases, only minimal changes to a particular phase will allow the system to be custom tailored to the particular needs of another type of business. □



Part four of four parts

Cost models, alternative technologies, future trends in the telephone loop

GEORGE T. HAWLEY and DONALD V. BATORSKY

The local telephone loop is a major source of local access costs. This fourth article of a four-part series examines loop costs, alternate loop technologies and the future of loop technologies. The first part of this series appeared in TELEPHONY, Oct. 29, p. 67; the second in TELEPHONY, Nov. 5, p. 36; and the third in TELEPHONY, Nov. 19, p. 56.

AS EXCLUSIVE franchises, local telephone companies are charged with the responsibility for providing universal local exchange and exchange access service to anyone at the lowest possible cost. In return, state franchising authorities allow telcos to earn reasonable rates of return on total investment.

In establishing rates, it has been the practice in many jurisdictions to average costs over large geographical areas so that customers on longer, low density routes might generally have rates similar to those of customers on shorter loops in high density areas. In the past, depreciation periods of several decades and contributions from toll call revenues helped hold down local service costs.

Divestiture of the Bell operating companies (BOCs) and the need to set local access charges for interexchange carriers has prompted fresh examination of local access costs. This scrutiny has been made more urgent as institutions, business users, cable companies and interexchange carriers have begun to provide local exchange services. Microwave radio, coaxial cable and optical fiber technologies are being used to bypass telephone company plant where rates exceed the perceived costs of bypass. This activity naturally encourages thoughts of market segmentation and cost based pricing by telephone companies.

Because the local loop is a major source of local access costs, it is important to understand loop costs and alternative loop technologies, and to think about possible future loop technology directions.

A model for total loop cost includes all capital and operating ex-

Continued on page 40

Table 1
Costs /voice channel for coaxial system

COAXIAL CABLE HARDWARE		CABLE PAIRS	
T—1 MODEMS	$290/CH	FEEDER (8 kft)	$280
DIGITAL CARRIER TERM	$350/CH	DISTRIBUTION (2 kft)	$330
COAXIAL MEDIA *	$0		
TOTAL	$640		$610

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George T. Hawley is Division Manager, Transmission and Terminating Systems, Bell Communications Research, Morristown, N.J. *Donald V. Batorsky* is the Manager of the Loop Cost Modeling District, Distribution Technology Center, Bell Communications Research, Morristown.

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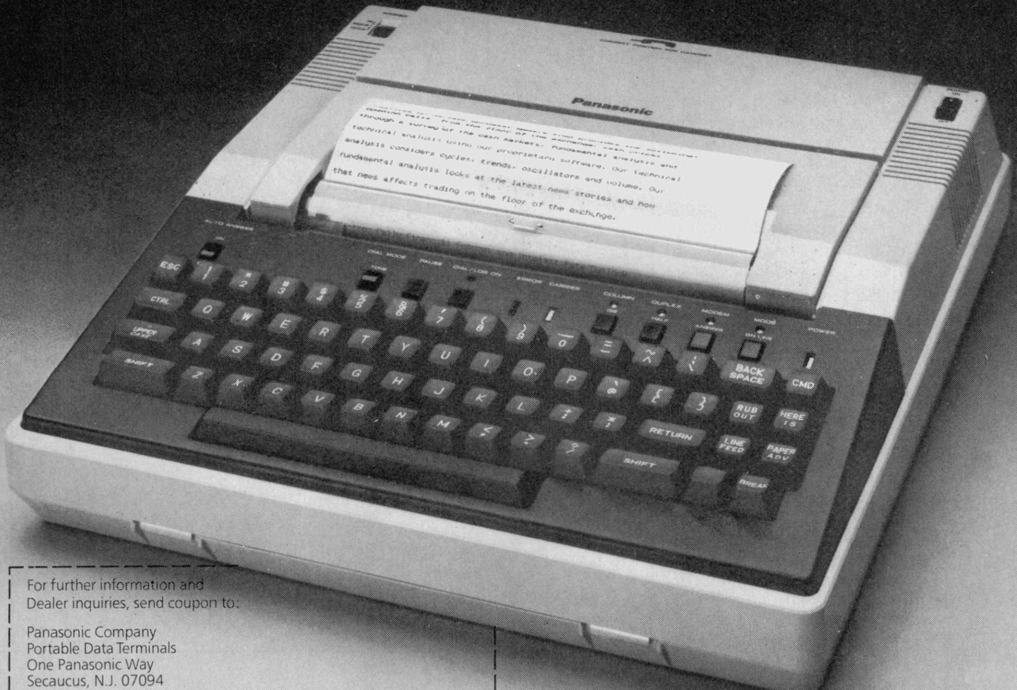

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pense contributions. Digital loop technologies can reduce costs in both categories when compared to new, paired copper cables installed for loops that are longer than average. They also provide direct bit stream interfaces to digital switching and interoffice technologies. The introduction of new digital network technologies simultaneously holds down the cost of providing basic telephone service and supports new services. In part, telephone company cost control reduces pressures on rates by maintaining revenue streams that could be lost to bypassers.

Expanding on these concepts and considering capital costs first, consider how investments in loop plant for suburban and rural areas are being held down by the introduction of digital loop carrier. Figure 1 compares the installed first cost per working pair for traditional paired cable to those of digital loop carrier systems based on either metallic or fiber optic facilities. In some circumstances, fiber optic systems can be economical when the carrier remote terminal is less than 15 kilofeet from the central office.

Digital carrier systems have several advantages that increase their use for serving growth. For one thing, their installation costs are less labor intensive than the installation costs of metallic facilities. Terminal equipment costs are dominant in digital system installations, causing total carrier costs to be less distance sensitive than comparable costs for conventional cable. The inflation rate for wages in recent years has been higher than the inflation rate of terminal equipment.

It increases the slope of cost as a function of loop length for metallic facilities relative to the cost of carrier terminal installations. In fact, the cost per channel of today's digital loop carrier equipment in terms of constant dollars is less than 15% of the cost per channel of 1972 designs! This cost behavior has enabled digital loop carrier systems to prove in economically at shorter distances from the central office as the technology has continued to mature.

For another thing, digital loop carrier can provide economical interfaces to interoffice digital cross connect systems and local digital switches at the DS1 rate of 1.544 megabits per second (Mb/s) and, potentially, at even higher digital rates. Analog interface modules to digital switches cost more per channel than digital interface modules due to the additional analog to digital conversions required.

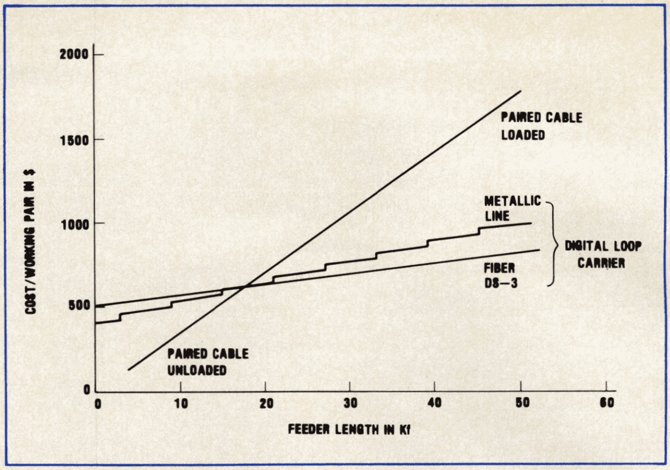

FIG. 1 *Installed first costs for working pairs (70% utilization).*

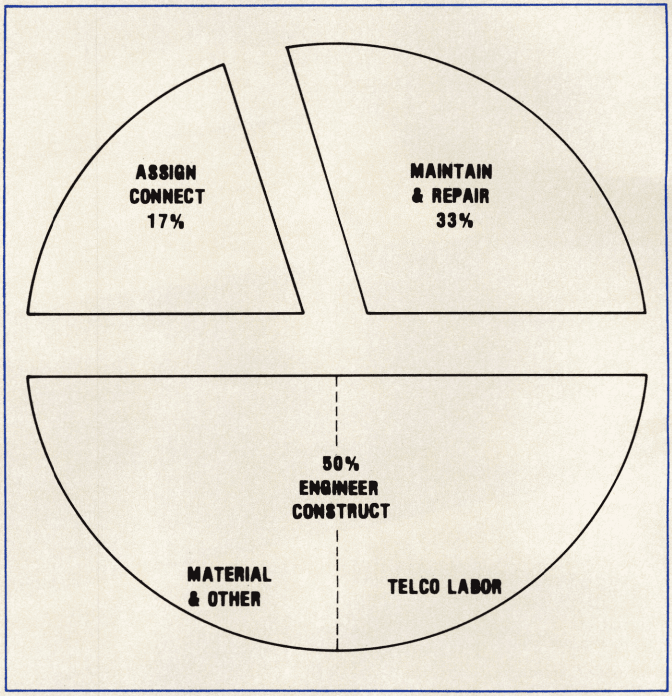

FIG. 2 *Loop plant annual expenditures.*

The impact of digital loop carrier systems includes consideration of maintenance and circuit provisioning expenses. Figure 2 shows the 1983 breakdown of $15 billion in combined annual expenditures associated with loop plant of the individual BOCs. About 50% of expenditures were for circuit provisioning and upkeep.

Cutting deeper

Introducing digital carrier into loop feeder plant can significantly reduce

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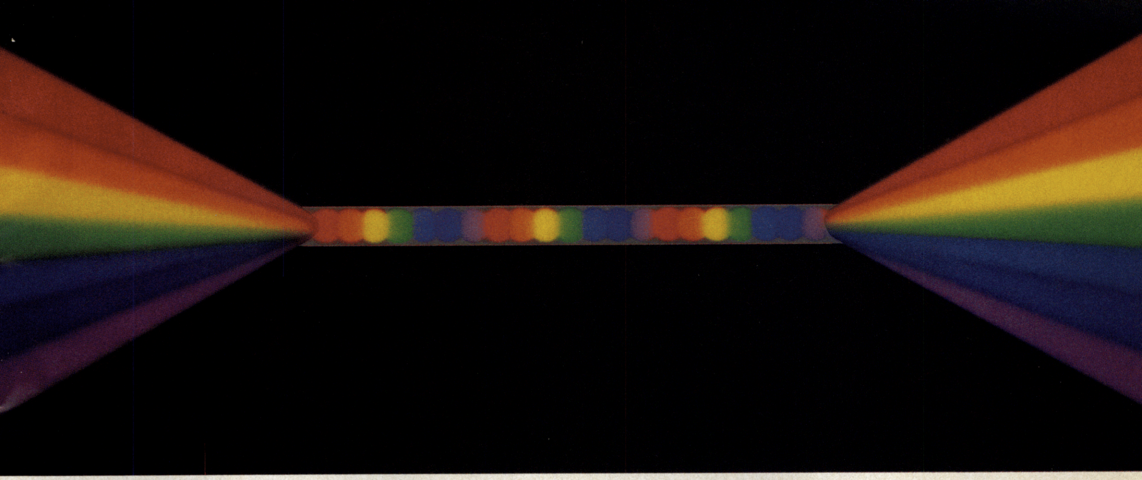

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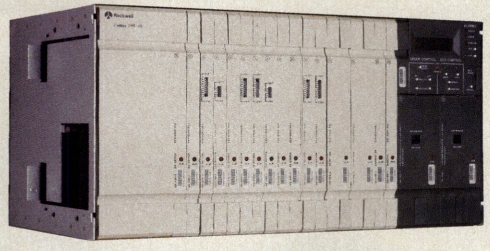

Until recently, the advantages of lightwave transmission were beyond the financial means of many companies that provide telecommunications in low-density markets. But no longer. Now, from Rockwell International, there's the Collins DML-45 digital multiplex lightwave system, a reliable, versatile transmission system that can actually make low-capacity lightwave more affordable than copper.

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customer trouble reports and feeder maintenance costs. Early studies have shown that, compared to all copper plant, the maintenance benefits from reduced activity in digital carrier feeder plant and the clustering of remote terminals reduce annual loop maintenance activity between 10% and 40%. A program is underway at Bell Communications Research (Bellcore), in cooperation with several operating companies, to further quantify maintenance savings.

Labor intensive loop conditioning, circuit design activity and electronic line equipment represent major additional components to basic loop costs for special services. Planners at Bellcore have addressed this concern with an integrated special services network plan (ISSN). The ISSN provides operating company planners with recommended guidelines for the introduction of digital cross connect systems, digital terminal hubs and digital loop carrier systems. Bellcore staff studies indicate that in areas with high concentrations of special services, the use of digital channel banks and digital loop carrier systems can greatly reduce those circuit provisioning costs associated with high growth and churn rates. Further benefits will accrue as operating companies introduce new digital electronic and optical systems and corresponding operational procedures matched to the capabilities of the new technologies.

To illustrate the supportive role loop technologies will have in introducing new services, Figure 3 shows the estimated cost of installing metallic T1 lines in the loop for DS1 (1.544 Mb/s) service. Two situations are considered. One assumes that T1 lines are installed after receipt of business customer requests. The second assumes that 50 of the T1 lines are installed at one time and that customer requests are satisfied on demand. In either case, the subscriber can order one or more DS1 channels. In the second case, using these lines both for DS1 service and for digital

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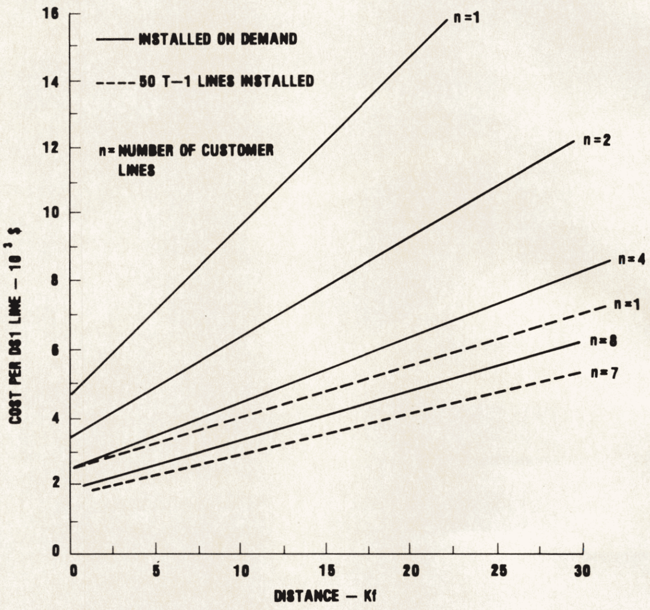

FIG. 3 *Installed first costs for DS1 lines.*

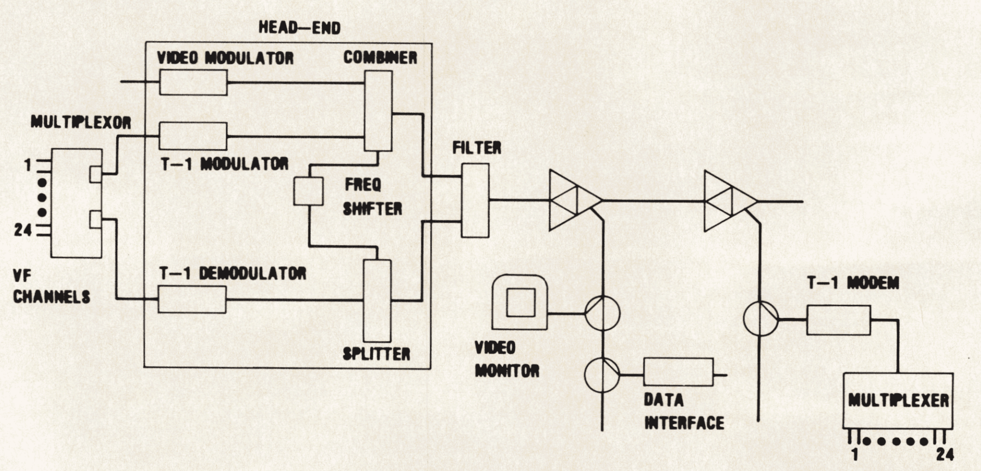

FIG. 4 *Coaxial cable architecture.*

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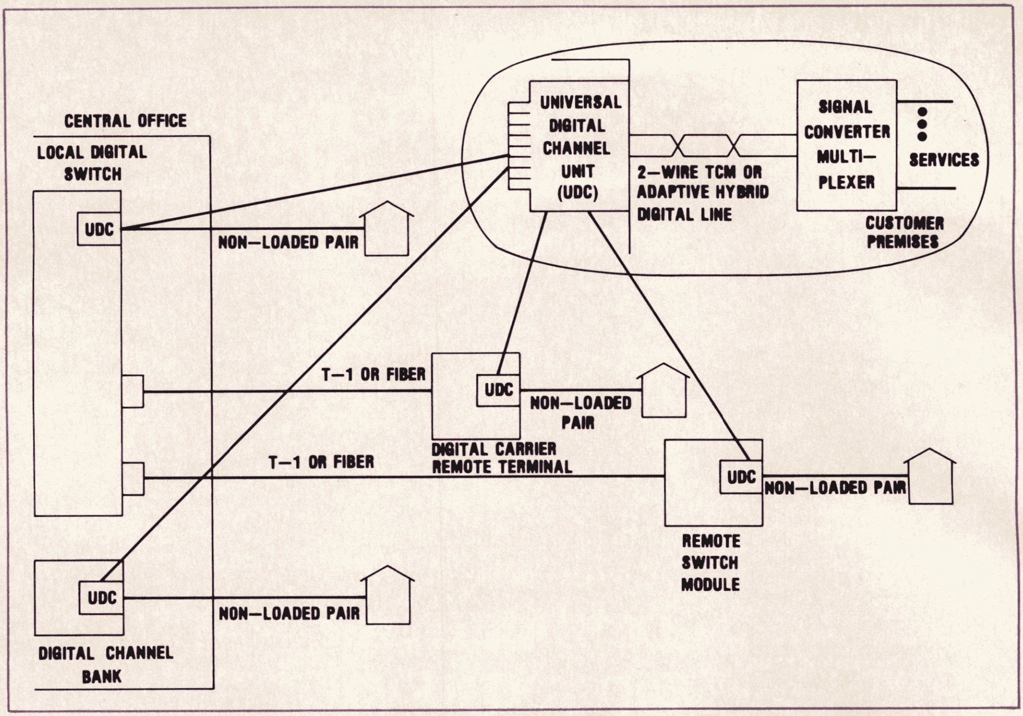

FIG. 5 *Potential digital subscriber loop applications using universal digital units.*

Table 2
Alternate T1 facilities

DS1—LIKE SERVICE COSTS ($000/1) NO. OF T—1 LINES	1	8	12
MICROWAVE RADIO			
UNPROTECTED FACILITY	11—41	12—18	9
PROTECTED FACILITY	55—106	26	12
DIGITAL LINE (INTRAOFFICE)			
10 kft	20	8	5
40 kft	40	10	6

FEEDER RELIEF APPLICATION NO. OF T—1 LINES	4	12	56
MICROWAVE RADIO			
UNPROTECTED FACILITY	19—26	9	4
PROTECTED FACILITY	27—41	12	6
DIGITAL LINE			
20 kft	6	7	6
50 kft	10	10	9

subscriber loop carrier system T1 lines results in a larger requirement, and the bulk conditioning yields lower marginal costs per channel. Fiber optic systems may increase this benefit because terminal plug-ins need not be provisioned until service is requested and, generally, there are no repeaters in the plant. Furthermore, advances in opto-electronic sources and receivers will permit increased data rates on existing optical fiber facilities and, thereby, defer the construction of new cable plant for a while.

Up to this point, the capability of digital loop carrier systems to reduce access cost has been emphasized, but specific services have not. As new digital services are required by subscribers, digital loop carrier systems and new digital subscriber line technologies will economically expand the capabilities of existing plant. A vision of this future is described after a look at some nontraditional technologies that will influence local access.

Nontraditional loop technologies, such as digital radio, are systems which have not been integrated into planning methods for facility relief of loop plant. However, as new ap-

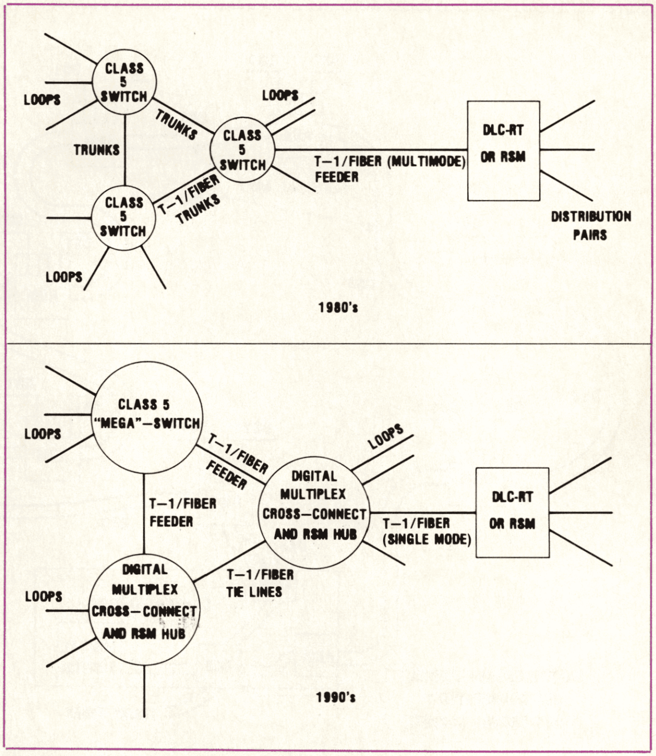

FIG. 6 *A possible intra-LATA trend toward megaswitches converting trunks to loop and wire centers to digital carrier hubs.*

proaches are considered for determining local access charges, strategies for applying technologies to provide local access need to be revisited. Nontraditional technologies may be a response to competitors in market segments that exist in part because of rate anomalies or may be a means of avoiding physical obstacles.

Coaxial cable technology to provide video transport is an example of a mature technology that has the potential to provide two-way digital data and analog voice services. Figure 4 shows an architecture suitable to provide this range of services. Voice service would be provided by using digital voice channel multiplexers that use channels on the broadband coaxial cable system instead of digital T1 lines.

A possible assumption is that message telephone and low bit rate data services would be provided in addition to community antenna television (CATV) transport services. Based only on an installed first cost analysis, and assuming CATV transport service pays the basic facility costs, there may be situations where the incremental cost of voice service is potentially competitive with the wire cable cost to provide a comparable service (Table 1).

However, from both a short term and a long term view, coaxial cable technologies probably will have limited applicability for voice and data services. In the short term, operational costs such as facility administration and maintenance costs are significant. Existing mechanized planning and administrative tools would require major revisions to support coaxial cable technology. But with high capacity optical fiber already being used in the loop, and representing a potentially more versatile long term medium than coaxial cable, this may not be a sound investment.

Although relatively mature, microwave radio must be considered in any discussion of nontraditional loop technologies since this technology presents many possibilities to support existing and new services. Digital termination systems (DTS) represent a metropolitan area network capability based on microwave radio. A Bellcore analysis of competitive technologies for digital data transmission indicates possible niches for DTS depending on data rates needed and a cross section of customer demand.

Point-to-point radio provides the capability for fast response to customer service orders and has been used by BOCs to circumvent outside plant obstacles. As a long term response to providing transport for DS1 rate services, point-to-point radio without facility protection represents an economic alternative for small cross section feeder routes or for wherever a radio link can be used to eliminate interoffice facilities.

On an installed first cost basis, feeder relief applications of microwave radio would be economical only for long routes with large cross sections. For any application, protected radio systems have generally had a higher installed first cost on paired cable than digital line facilities do, but they may allow quicker response to a service request. Table 2 illustrates installed first cost comparisons.

Digital radio, as with other nontraditional loop technologies, can provide services that are similar in bandwidth or data rate but performance criteria may vary. DS1 service, currently has stringent requirements that may not be met by a microwave radio-based service under all conditions. On an installed first cost basis, microwave radio may be competitive in some applications. However, significant work remains to be done to define technology requirements necessary to meet service objectives. Nonetheless, as operating companies study coaxial and radio alternatives, they are aggressively deploying fiber in the loop.

Never in the history of telecommunications has the prospect of technological advances in local distribution plant been so bright. Most operating companies already have found use of multimode fiber practical in the local loop, and there is a strong push throughout the industry to place single mode fiber in the loop.

On-the-reel single mode cable prices now match the prices of multimode cable with the same number of fibers. Single mode loss allowances are lower, the bandwidth-distance product is much higher, and there is no modal dispersion. Dual window fibers and advanced modulation techniques give single mode fiber several orders of magnitude more future potential bandwidth than multimode fi-

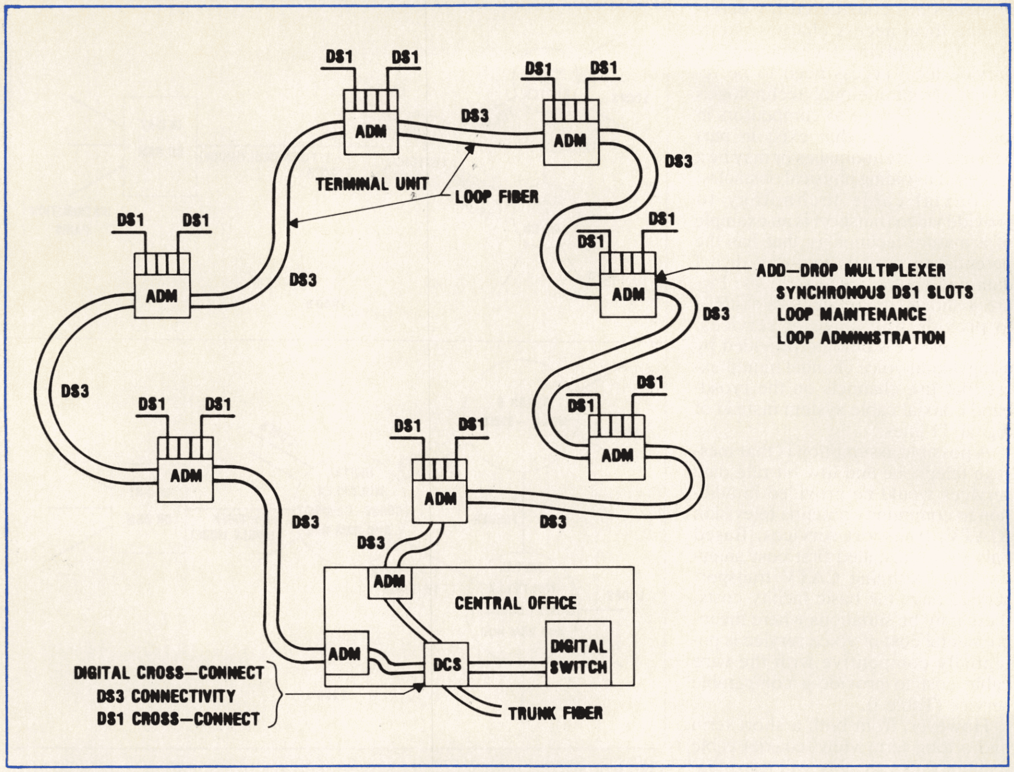

FIG. 7 *Possible loop distribution using synchronous DS3 signal format.*

ber of the same length. Presuming that advances in device technologies continue at the torrid pace of the past 30 years, the costs of laser diode transmitters and avalanche photodiode receivers will plunge dramatically. At the same time, their transmission and environmental properties also will improve. Laser diodes that are expected to have a lifetime of a decade or more at room temperature already exist.

Field splicing of single mode fiber can be difficult and equipment costly. However, early experience suggests that very low loss splices are achievable and, as volume builds, equipment costs will decline.

Single mode fiber will become a routing loop technology by the late 1980s. As the use of fiber grows, it will reduce the impact of that old nemesis of the outside plant engineer: demand forecast along the loop cable route. If expected growth does not take place, the relatively high cost terminals can be installed at other sites. If demand is greater than anticipated, more terminals can be added and interfaced with existing fiber.

Technology that continues to expand the value of existing copper plant also is making rapid strides. Full-duplex, baseband digital transmission—such as digital subscriber lines (DSL) at 64 kilobits per second (kb/s) and higher rates—now is a technological fact for copper pairs. AT&T Technologies' time compression multiplexing (TCM) transmission technique is one example that is in use today (TELEPHONY, May 21, p. 50). Northern Telecom's Datapath capability uses another version of TCM.

The first application of TCM is for switched, alternative voice/data service supporting synchronous data rates of 9.6 kb/s and 56 kb/s. There are literally dozens of vendors and government laboratories in the United States and around the world with TCM and adaptive hybrid technologies in various stages of development for DSL applications. While most DSL transmission techniques under development use proprietary technology and are incompatible with one another, all systems give telcos a very powerful new tool for providing many new or existing business services in the next few years. Two-wire, full-duplex digital transmission to the customer premises also is a cornerstone for integrated services digital network (ISDN) capability.

Figure 5 illustrates how digital switches, digital channel banks and digital loop carrier remote terminals or remote switch modules all can use the same loop channel technology to provide a variety of services. Known as the universal digital channel concept (UDC) at Bellcore, channel units supporting DSLs at 64 kb/s and higher rates will make the loop facility service-independent. Mirror-image circuits at the customer's end of the network can provide a single service, or multiplex two or more channels. Local area data transport (LADT) service, for example, which multiplexes simultaneous voice and data channels, can be provided in this way over digital carrier.

Examples of existing services that

Continued on page 50

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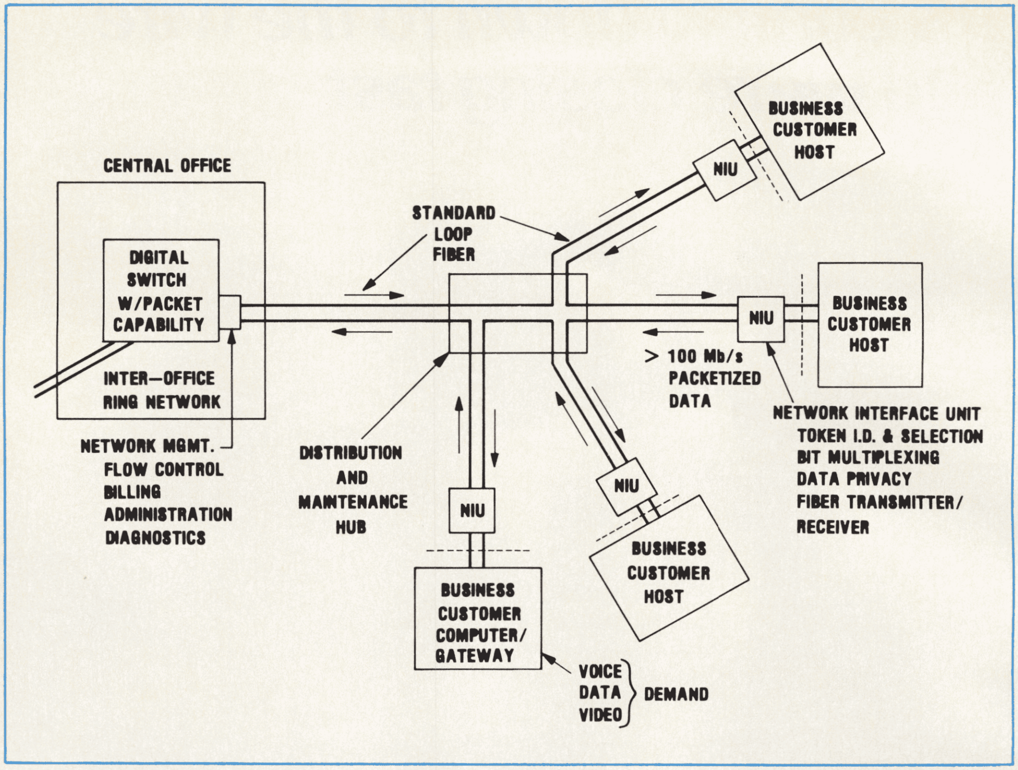

FIG. 8 *A possible future high speed packet ring on loop fiber.*

will benefit from introducing two-wire digital subscriber lines are four-wire private branch exchange receive and transmit leads, tie trunks, and four-wire voiceband data private lines. Conversion from four-wire to two-wire transmission saves capital while digital transmission to the customer premises eliminates complex, voiceband loop equalization, gain or impedance matching adjustments required to compensate for wire pair impairments. Operating companies are already trying TCM transmission technologies with these capabilities from several vendors. Future advances are expected for two-wire digital transmission, including large scale integration (LSI)-based, echo canceller technologies already on the horizon. They will offer 60% reduction in bandwidth compared to TCM for the same digital transmission rates. Much work remains to be done to derive network interface standards for DSLs.

Figure 6 illustrates the progression of hierarchical digital transmission in the loop with carrier remote terminals and digital remote switch modules proving in as close as 12 kilofeet from the central office in the future. With single mode fiber likely to dominate both local trunk and loop feeder applications in the late '80s, it is obvious that smaller central offices begin to look like large loop remote terminals or remote switching module sites. Older switching equipment could be phased out of inefficient sites and replaced by carrier terminals or RSMs homed on giant central offices, or mega-wire-centers, where maintenance and administration interfaces to operations support systems can be located. In some smaller local access and transport areas (LATAs), it is conceivable that there could be a single Class 5 office with local trunks reduced to digital cross connects in super-capacity digital switches.

Also on the horizon are alternative architectures with great potential that use the same high speed digital transmission technologies on optical fiber in a different way. Figure 7 shows a network of synchronous transmission (SYNTRAN) multiplexers with add-drop capability supporting a very flexible ring network on fiber. High speed packet networks that operate at data rates in excess of 100 Mb/s are now feasible on the same fibers that can carry conventional synchronous, hierarchical signals or multiplexed video signals (Figure 8). Operating companies will be able to offer business customers very flexible voice, data and compressed video connectivity over packet rings within a LATA.

If customers pay by the packet, such networks offer the potential of customer control over communications services and costs within a LATA. The costs will be held down by customers sharing the same facilities. Information privacy will be provided by telephone company network interface units on customer premises. If operating companies are able to make such networks an economic reality, the loop plant of the future will be more a telecommunications super-highway than a bottleneck. □

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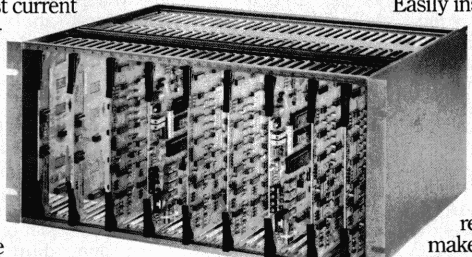

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Optical technology: its effect on the network

L.R. LINNELL

THE INCREASED bandwidth capabilities of emerging optical technologies offer new opportunities as well as challenges in the design of telecommunications systems. Service capabilities will no longer be limited by the networks' inability to transport the required bandwidth economically. Telcos must capitalize on this tremendous bandwidth in order to increase service capabilities and reduce communications costs.

Due to economic considerations long haul and interexchange facilities will be replaced with fiber systems. The high bandwidth capability of the installed optical systems will result in these facilities having bandwidth potential far in excess of that required for the transmission of plain old telephone service (POTS). Some of this excess bandwidth will be used for nonswitched, wideband services for large business customers. Local transmission systems will make extensive use of optical pair gain systems and additional facilities will be installed for future wideband services. Local operating companies may become wideband transport providers by installing fiber drops and wideband switching capability. As the market for wideband switching expands, interexchange and long haul systems will add wideband switching capability and use the excess bandwidth of their fiber facilities.

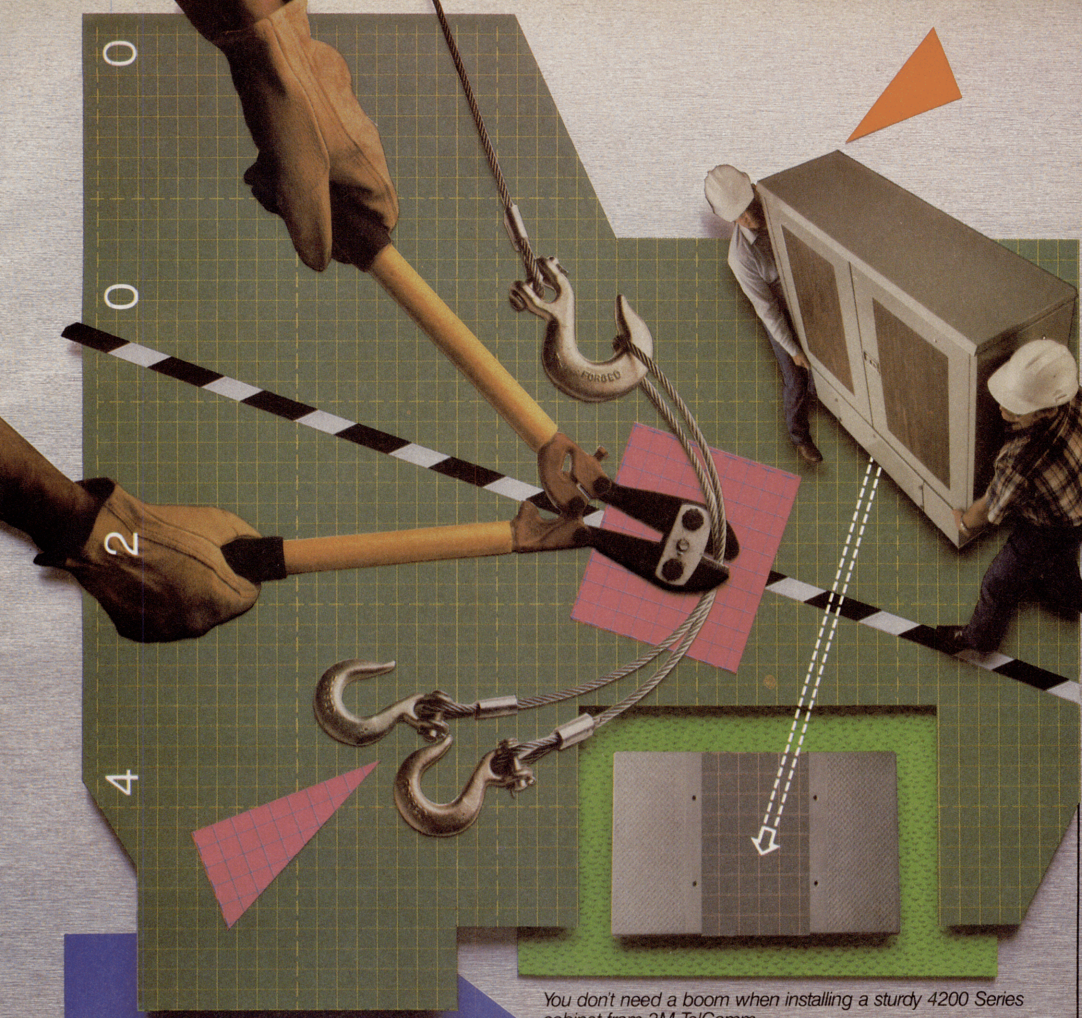
The optical revolution should not be viewed as a microcosm but rather as part of the complete environment of technological evolution. The large transmission bandwidth will have limited application if there is no technology suitable for switching such high speed information. Likewise, diverse service offerings will require greatly expanded signaling capability, more complex protocol functions and improved software systems for control, administration and maintenance. In the future, telecommunications systems will be built by applying synergistic technologies that mature in approximate synchronism; no single technology will have a significant effect on the network without similar advances in other technological areas.

The telecommunications network concepts to be explored in this article are not the result only of advances in optical technology. They are the result of the combined effects of abundant and low cost bandwidth, inexpensive processing power, availability of sophisticated software sys-

Continued on page 56

'The optical revolution should not be viewed as a microcosm but rather as part of the complete environment of technological evolution. The large transmission bandwidth will have limited application if there is no technology suitable for switching such high speed information.'

L.R. Linnell is District Research Manager for Bell Communications Research, Holmdel, N.J. This article has been adapted from a speech made during the National Communications Forum, held Sept. 24-26 in Rosemont, Ill. It is published with the permission of Bell Communications Research.



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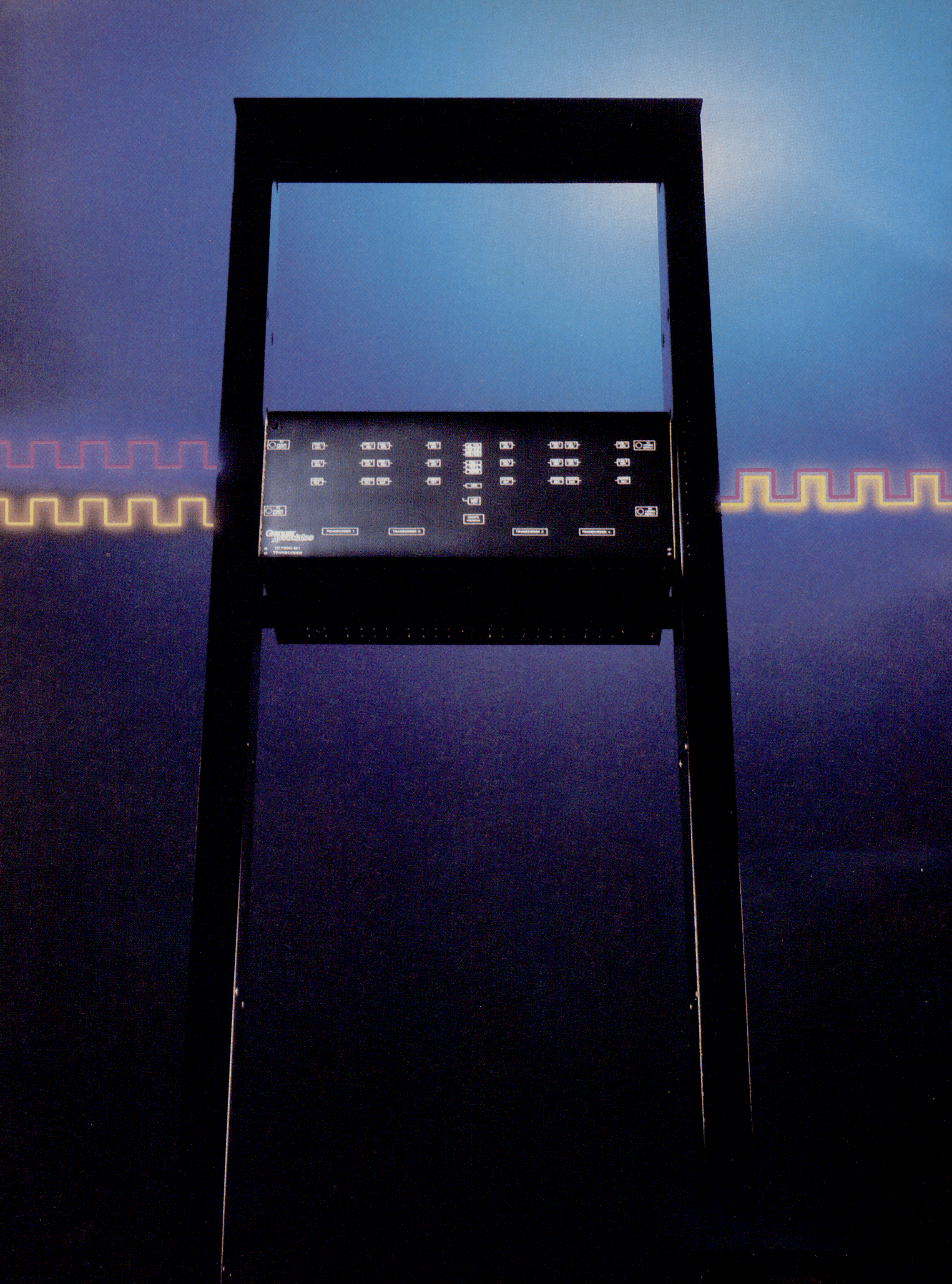
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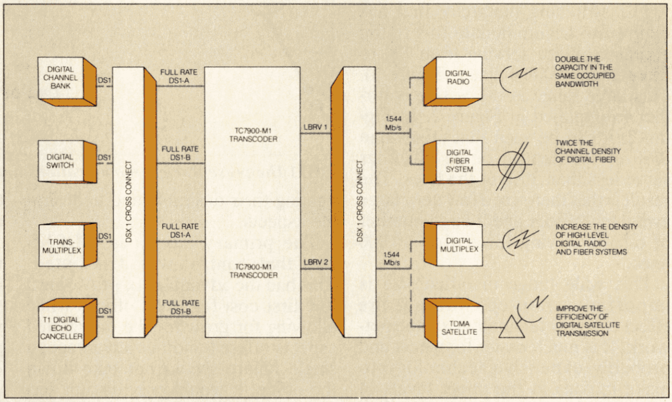

Typical applications of the Granger TC7900 Transcoder.

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tems and numerous other advances in the hard and soft sciences.

Present telecom network

The existing network has done an admirable job in delivering voice traffic over the primarily copper facilities of which it is comprised. This network was designed to provide acceptable transmission quality and blocking characteristics for the voice traffic on which it was based. This traffic is characterized by 3 minute holding times, three call attempts per busy hour, and 3 kilohertz (kHz) analog bandwidth; hence, the network is often referred to as the 3-3-3 network.

The switching hierarchy that has evolved to accommodate this traffic contains offices serving from 100 to more than 100,000 lines (Figure 1). This large range in office size is further exemplified in Figure 2. In Figure 2, it can be seen that more than 80% of the central office buildings serve less than 30% of the lines. The result is that there are a few very large switching offices and a large number of offices serving fewer than 10,000 lines.

This wide range in office size is important when considering the effect of a new technology on the network. It is much easier for a new and probably expensive technology to make inroads in the upper levels of the switching hierarchy than to find use within the smaller, more cost sensitive offices. If the newer technologies are to have a significant effect on mass communications capabilities, then the needs and sensitivities of these smaller offices must be considered as well. These needs include low first cost for small systems, smooth growth characteristics, unattended operation and high reliability.

The existing network is comprised of a number of switching systems of various vintages, each designed to cover a particular range of office sizes. Of particular interest is the step-by-step (SXS) system. Although SXS switches are certainly obsolete, there is much to be learned by investigating their desirable and undesirable aspects.

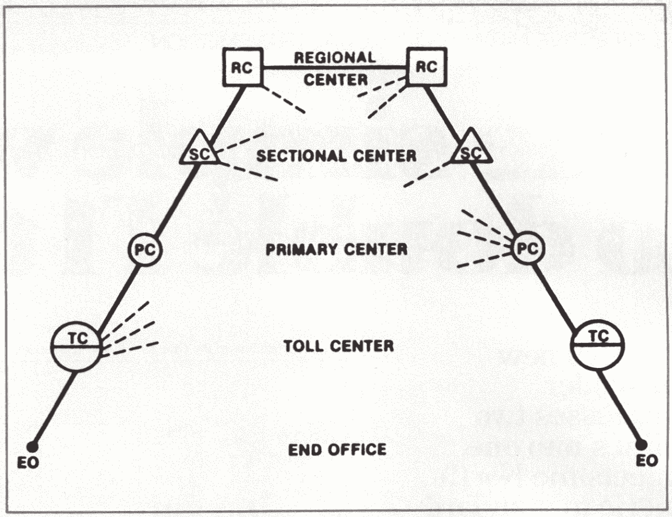

FIG. 1 *The present telecommunications network.*

'Increasing bandwidth demands are only part of the market pressure.'

The primary advantage of SXS was that control was distributed. This had the advantage of providing a low first cost for small offices while allowing for growth. The distributed aspects offered another advantage; a single failure would not take down the office, it would only disrupt service for a small number of subscribers.

In fact, the SXS system is so reliable that it has set the reliability standard that future electronic switching systems (ESS) were required to meet. SXS systems also had a number of shortcomings, including their inability to allow the addition of features; their intelligence contained in the mechanical nature of the machine; and their method of physically interconnecting their pieces.

The advent of stored program control (SPC) brought the ability to modify the instructions given to the call processing element and, thus, the ability to more easily change the features provided to subscribers. Centralized control was mandated by the high cost of processing elements, which had two effects. The first was that a single failure could cause total office failure, and duplication of processors for increased reliability was necessary. Along with duplication came increased cost and the second effect, a high first cost. For this reason, the rapid replacement of electromechanical with ESS equipment has taken place at the higher levels of the hierarchy; there are still almost 6000 SXS systems in use, primarily used as community dial offices.

Telcos are now in a position where the advances in technology will again allow them to consider distributed switching systems. This time, these systems will be based on silicon or gallium arsenide rather than on large electromechanical devices.

Factors causing network change

There are two primary forces changing the network: market pull and technology push. Network users are demanding increasingly sophisticated communications capabilities. Users are no longer satisfied with a network that provides a restrictive 3 kHz communications bandwidth. There is an increasing demand for a wider bandwidth communications network capable of supporting a host of new high speed services.

Increasing bandwidth demands are only part of the market pressure. More sophisticated services, introduced in much shorter time intervals, also are highly sought. There is an increasing demand on the part of business users to have a more active role in the definition and implementation of new services.

The existing 3-3-3 network is based on calling statistics for voice communications. As the amount of other traffic increases, overall calling statistics change, causing the network to provide less than optimal performance. The increase in terminal and other bursty data traffic has had the effect of pushing the network toward

Continued on page 60

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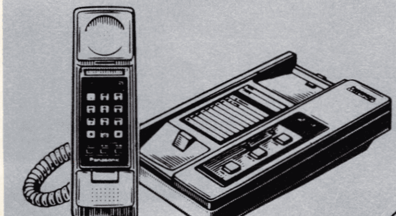

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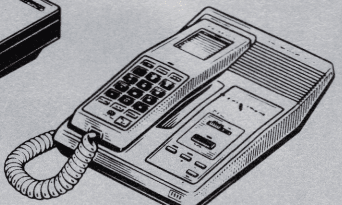

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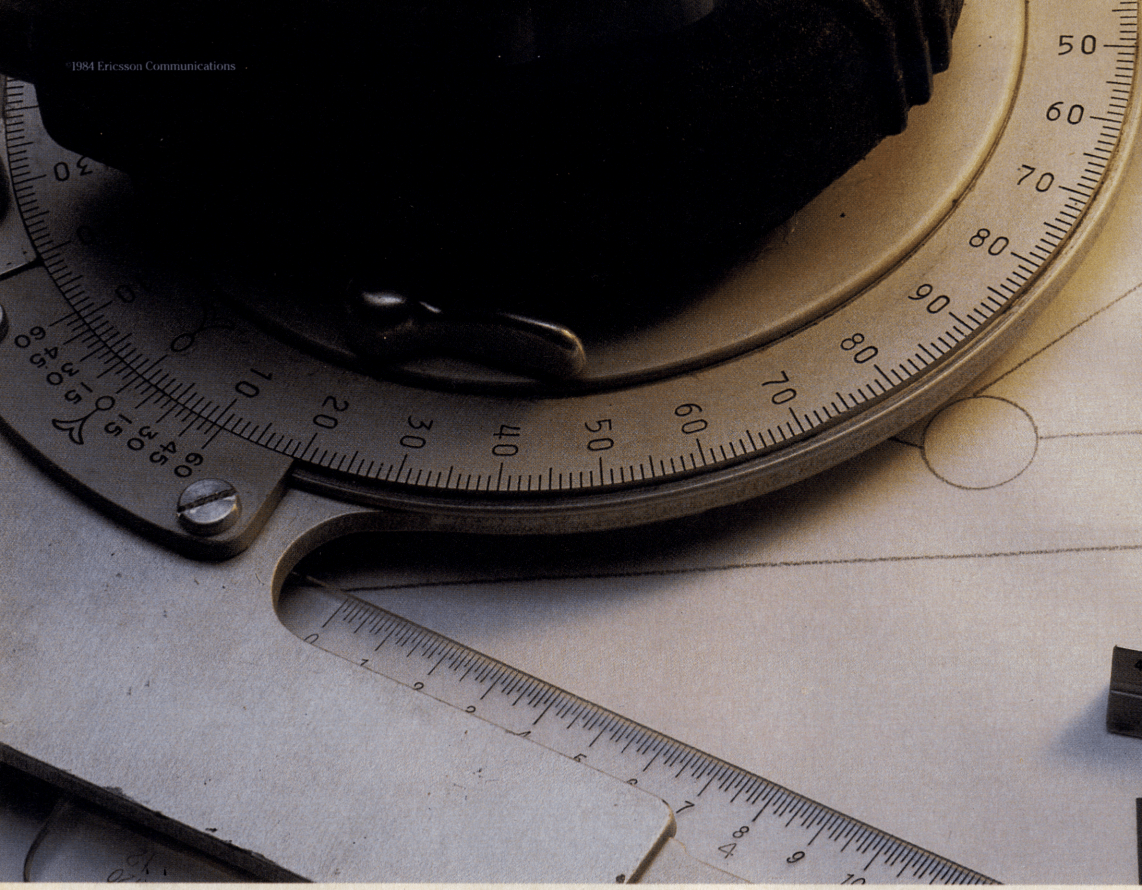

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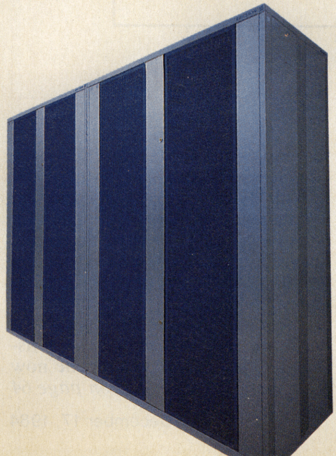

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the provision of a new transport type optimized for bursty traffic with possible long call holding times. A number of solutions have been proposed for this type of traffic, including packet and burst switching.

On the technological side, the advances in optical communications have had the immediate result of drastically reducing the cost of long haul transmission systems. Figure 3 shows the dramatic increase in fiber shipments within the United States and the corresponding decrease in cost per cabled meter. If these fibers are used at a modest bit rate (DS-3) compared to their capacity, by 1990 the latent installed bandwidth of optical transmission systems (in circuit miles) will approach that of all delivery systems other than fiber combined. In other words, in the next 6 years, the network capacity in circuit miles will essentially double. Clearly, this additional bandwidth will not be used simply to carry more POTS traffic, but to carry it farther without repeaters and at a lower cost.

How will this tremendous bandwidth potential be utilized? It will probably be allocated among three broad market areas: POTS services, nonswitched wideband services and future switched wideband services. Existing deployment of optical systems has been generally replacement oriented. Optical systems presently are being used to increase the number of voice circuits or reduce the cost of delivery. Few new wideband services have resulted from the application of this new technology, because optical transmission systems prove-in first for long distance, high bandwidth applications. In the long distance arena, the high bandwidth inherent in optical systems enables the transmission of a large number of voice circuits with low susceptibility to electromagnetic interference (EMI) and high transmission quality. The large number of voice circuits results in a low per circuit cost. The result has been a rapid growth in the deployment of optical technology in long distance transport systems. Optical applications for this market will be dominated by cost reductions and service quality enhancements.

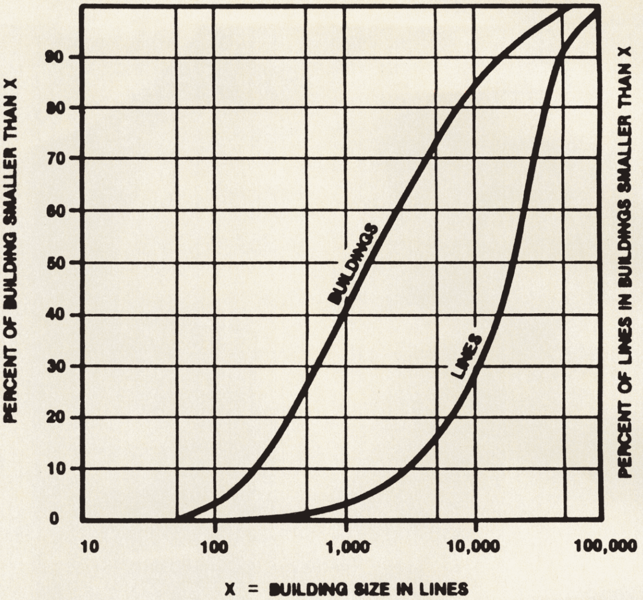
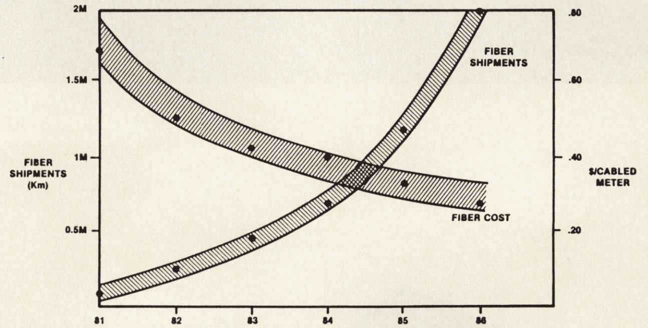


FIG. 2 *Cumulative distribution of local exchange buildings and lines. Reprinted with permission from "Introduction to Telephone Switching" by Bruce Briley.*



(SOURCE: KESSLER MARKETING INTELLIGENCE)

FIG. 3 *U.S. fiber shipments/cost to 1986.*

Without a wideband capability at the local office level, long distance and interexchange facilities can offer little in the way of new wideband switched services. Nonswitched, wideband services for large business customers will become increasingly important. As local wideband switching becomes widespread, interexchange and long haul wideband switching capability will be added.

Optical communications represents only one of the synergistic technology areas that have a significant effect on the communications network. Hardware capabilities have continued the now familiar advances in speed and complexity. These advances are due to progress in both the hard and soft sciences. Higher speed, smaller geometry devices result in the capability to design extremely complex subsystems on a chip. The availability of computer-aided design and manufacture tools, and the more recent availability of very large scale integration design tools and silicon foundries make the design of such subsystems practical.

The result of these advances is that hardware processing systems and associated peripheral equipment now

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N.C.C. & E., Inc.
NEC Information Systems
NEC America, Radio & Transmission
NEC America Telco Div.
NEC Corporation
NEC Telephones, Inc.
National Applied Computer Technology
National Communications Corp.
National Econotel
National Trade Products
Navtel, Ltd.
Neptune Water Meter Co.
Neuses, Inc.
Newcomm Electronics
New England Insulated Wire
Newton Instrument Co.
Nitto Denko America
Nixdorf Computer AG
Norstan Communications
North American Philips Co.
North American Soar Corp.
North Supply
Northeast Electronics (Northern Telecom)
Northern Telecom-Cook Electric
Northern Telecom
Northwestern Bell
NovAtel Communications
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Nutmeg Utility Products
OK Machine & Tool Corp.
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Pengo-Jetco Equipment
Penwalt Corporation
Personnel Concepts, Inc.
Personnel Resources Int'l.
Phalo
Philadelphia Insulated Wire
Philips Business Systems
Philips Communications & Equip.
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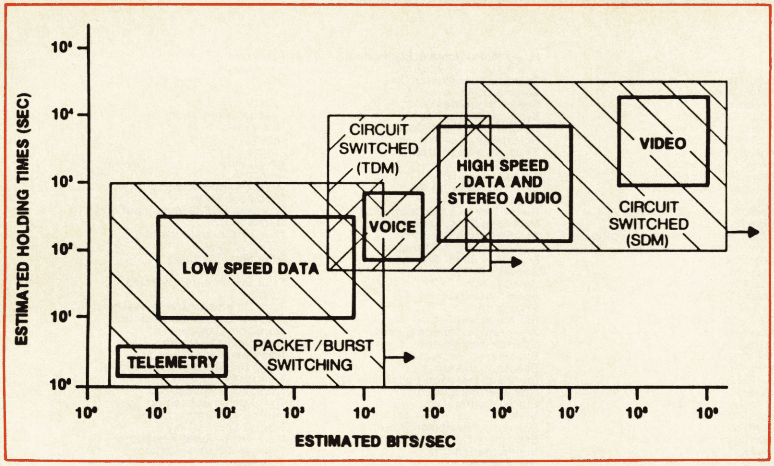

FIG. 4 *Dynamic range of services.*

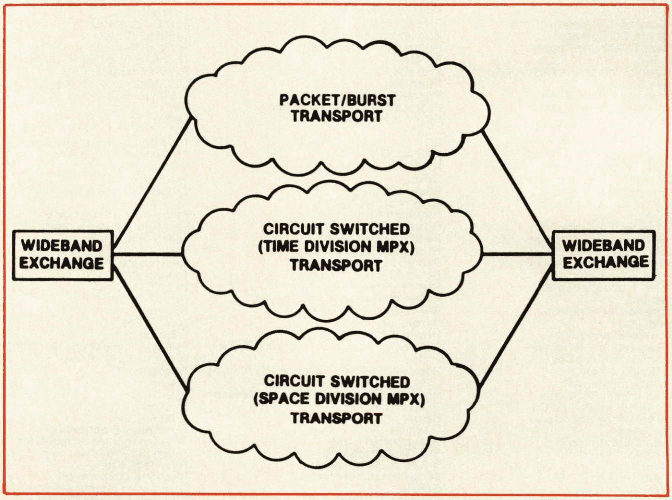

FIG. 5 *Network with multiple transport types.*

are economical enough to allow switching systems consisting of large numbers of processors operating in a distributed processing environment to be designed.

Advances in software engineering are equally important. Hardware alone does not constitute a distributed processing system. Software advances are much more difficult to quantify but significant progress has been made on a number of fronts.

As the network users demand more services and features, the required software becomes increasingly complex. The size of the software effort to produce such systems is quickly becoming unmanageable. If a multimedia system is to be capable of handling many different transport types and providing a wide range of services, the software system may be impractical to implement, if it is approached in the conventional manner.

One of the primary challenges facing software system designers in the future will be to learn how a large, complex set of switching functions may be partitioned such that the various pieces may be developed virtually independent. Operating companies or sophisticated users may enhance or modify their feature set without having to generate the entire operational software.

Wideband optical net

Before a definition of a wideband communications system is offered, it would be helpful to investigate the various services to be offered by such a system.

Figure 4 illustrates a plethora of possible services ranging from very low bit rate telemetry to the extremely high bit rate, high definition digital video services. With the explosive growth of community antenna television (CATV) distribution systems, the delivery of broadcast video should be seriously considered. The revenue stream generated by the transmission of video entertainment services would provide an economic incentive for the deployment of a wideband communications system.

This service offering should not be limited to delivering existing National Television Systems Committee (NTSC) quality video material; provision should be made for the delivery of higher quality, high definition video material as well. These higher resolution and quality video signals require sufficiently large bandwidth that transmission over satellite, radio frequency transmission or even coaxial cable distribution may not be economical. In this case, the wideband communications network may be the only viable delivery mechanism for these high bandwidth video signals.

Figure 4 also illustrates the wide dynamic range in bandwidth required for these services. Figure 4 also identifies a spectrum of switching mechanisms that could be used to provide necessary switching functions. Three distinct switching methods are shown: packet/burst switching, cir-

Continued on page 66

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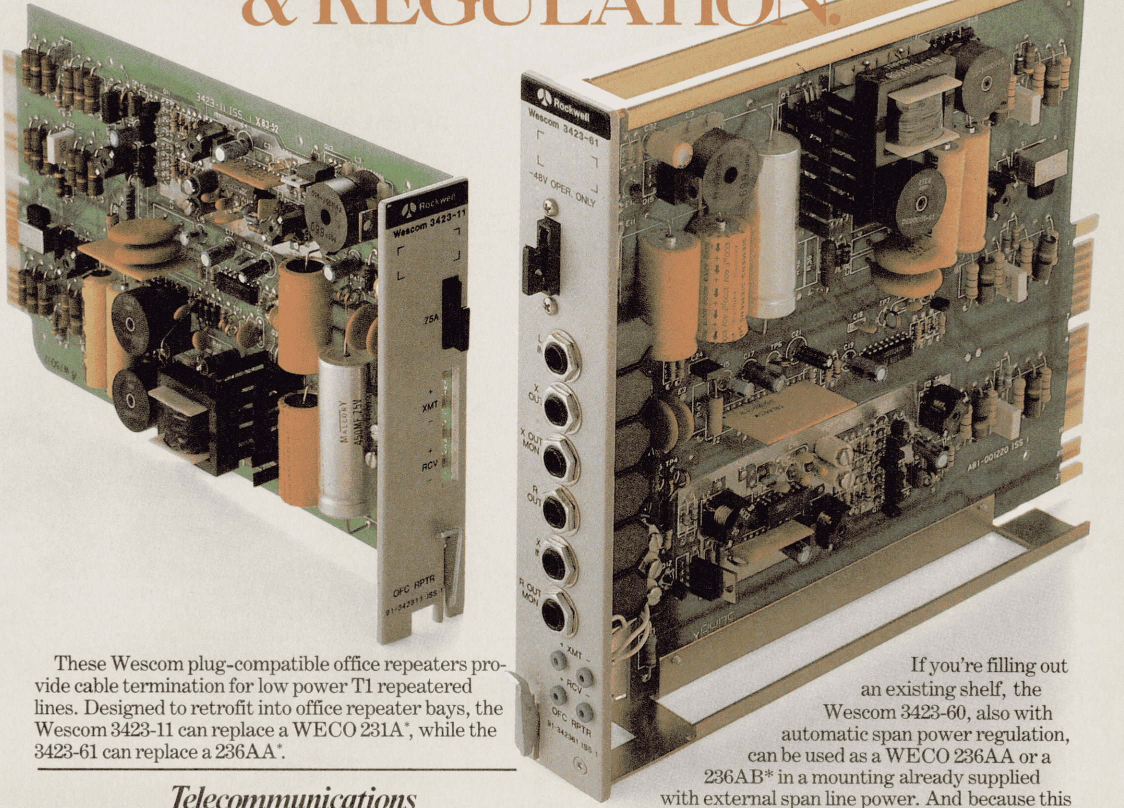
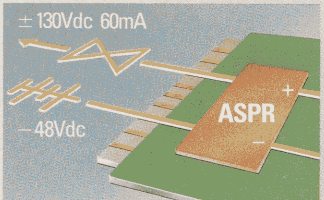


These Wescom plug-compatible office repeaters provide cable termination for low power T1 repeatered lines. Designed to retrofit into office repeater bays, the Wescom 3423-11 can replace a WECO 231A*, while the 3423-61 can replace a 236AA*.

Telecommunications by Rockwell

And since they were designed by Wescom engineers, they're more than just replacements. Both have Automatic Span Power Regulators to automatically compensate for the variations in cable and repeater tolerances caused by manufacturing, temperature or routing. So they provide consistent current to line repeaters.

These repeaters derive all necessary voltages from the −48Vdc office battery. By eliminating external 130V power supplies, they improve reliability, lower costs and eliminate problems associated with installing and maintaining external power supplies. Both can also be employed for terminating T1 lines on customer premises.



If you're filling out an existing shelf, the Wescom 3423-60, also with automatic span power regulation, can be used as a WECO 236AA or a 236AB* in a mounting already supplied with external span line power. And because this office repeater can handle two powering functions, looping and simplex power feed, it can replace two of its equivalents.

Wescom Compatibles—office repeaters and D4 plugs—are designed to be more than just replacements, and they are backed by the Wescom 5-Year Warranty.

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cuit switched time division multiplex (TDM), which is considered a time-space-time network, and circuit switched space division multiplex (SDM). The switching speed limitation for each technology is continuing to advance and the values shown in Figure 4 are not illustrative of any particular product. Figure 4 shows that for a particular technology space division switching will generally be able to switch higher bit rates than time division switching, and time division should offer faster switching speeds than packet/burst technology.

Figure 5 shows a network consisting of all three transport technologies. Circuit switched, TDM, 64 kilobits per second (kb/s) transport is in widespread use in the higher levels of the switching hierarchy. In the short term, this transport type will probably form the backbone switching fabric for low and medium speed digital switching. The bursty nature of many traffic types has created an economic incentive for packet/burst switching technology. As this technology matures, it may emerge as a viable transport alternative for voice traffic. On the high bit rate end of the spectrum, space division switching is used to perform switching operations on the various video signals (digitized NTSC through high definition) as well as other high speed data.

The high bandwidth offered by optical technology will have a significant impact on network control as well as network transport. A metallic processor bus may now be replaced with the optical equivalent. The insensitivity to EMI, low loss and high bandwidth afforded by such a link allows distributed processors to be physically remote yet communicate independent of the physical separation. Figure 6 shows several possible optical interconnect structures for processor to processor communications.

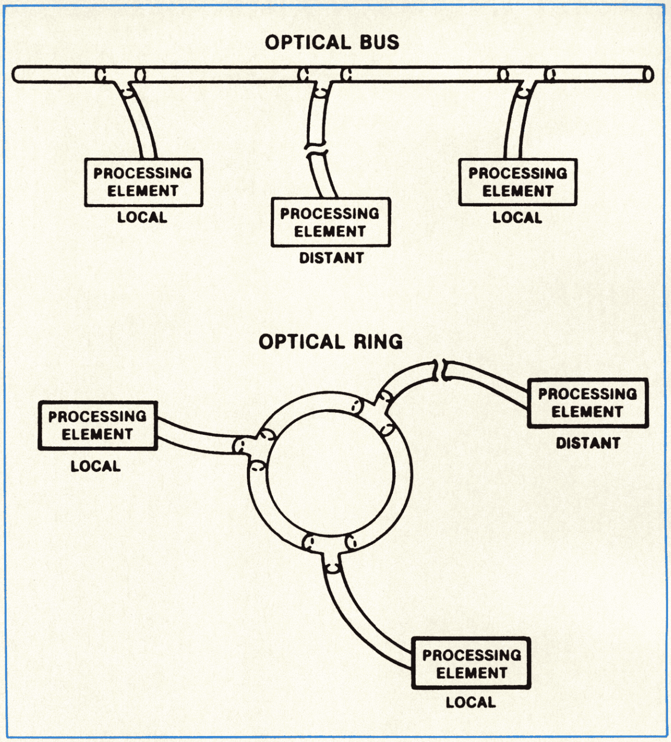

FIG. 6 *Possible optical interconnect topologies.*

This communication need not be limited to processor to processor; remote memory for paging and database query are also likely. Concentration electronics may be placed close to the subscriber for maximum advantage and the controlling electronics may be securely placed inside a distant central office. This tremendous flexibility in the partitioning of functions will open up a number of new avenues in network control topology.

Evolution of the network

What are the possible evolutionary strategies that would allow the present telecommunications network to evolve toward an all-fiber wideband network? Two major transitions already are underway: local common channel interoffice signaling (CCIS) and local digital switching.

Local CCIS provides several important attributes to the communications network. One is a higher level signaling and control mechanism between components of the network. This additional control capability is required if more complex services are to be provided. Another aspect of CCIS is that it is based on packet transport.

At the present time, separate packet transport networks are being proposed, field tested and offered by communications suppliers for use by network traffic. This would result in separate switching networks for network signaling and control, and network traffic. It is conceivable that these networks will merge into a single packet/burst facility with the delay characteristics necessary for the transmission of voice, the reliability and security mandated for network signaling and control, and the throughput capability required for low and medium speed data. The result would be a single packet/burst network that would be used for a wide range of bursty services. As can be seen in Figure 4, if packet technology advances sufficiently, 64 kb/s circuit switching may not be required. Packet/burst switching would be used on all but the highest bit rate services with space division circuit switching being used on those services outside the capabilities of the packet network.

The second major change is the availability of local digital switching systems. Several manufacturers have introduced these products, offering various amounts of distributed processing and remote switching capabilities. Although the systems presently being offered are based on 64 kb/s circuit switched technology and retain the stimulus oriented signaling of the past, the industry is in an era of rapid change in switching technology. Switching speeds have not kept pace with the dramatic progress in transmission speeds. The result is that switching is creating a bottleneck and inhibiting the growth of new

Continued on page 68

Making telephone service bloom in the desert.

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wideband services. Today's 64 kb/s switching systems may need to add integrated services digital network (ISDN) capability in order to secure their market share. Even that may not prove sufficient; these products also may be required to evolve toward a wideband ISDN, including video transmission, to justify the capital investment necessary to replace the existing switching systems.

The advances in optical technology will not alone radically alter the present communications network. If these advances are coupled with progress in the hard and soft sciences, there will be strong motivation for significant alterations of the present telecommunications network. These changes will transform the narrowband telecommunications network of today into the wideband communications network of the future.

This future communications network will be fiber based with subscribers having fiber rather than metallic access to the network. Subscriber terminals will possess increased intelligence and the resulting switching functions will be highly distributed. The service capabilities will span from very low bit rate telemetry services to very high bit rate, high definition digital video services. To provide integrated access to such diverse service offerings, the signaling mechanism employed to initiate service requests will become increasingly sophisticated, employing message- or function-oriented signaling rather than the stimulus oriented signaling in widespread use today. With the quickening pace of technological evolution and obsolescence, future systems are likely to be designed so they are extensible. The network will become the provider of transport capability and the user and marketplace will interact to produce services and features based on these transport capabilities.

The transition from a telephone based network to a network based wideband communications will not occur overnight. The bandwidth will first be installed in the network in the form of large scale deployment of optical fiber. Switching and integration of services will follow as new markets begin to develop.

The next decade will no doubt be exciting as these new technologies are actively deployed. The result will be that communications capabilities, the work and home environment and, thus, people's lives will be significantly altered. ☐

Cellular sobriety and market discipline

Cellular entrepreneurs remain optimistic, but the time to go to market has come. Enthusiasm isn't enough anymore

LARRY LANNON, EXECUTIVE EDITOR-FEATURES

CELLULAR communications is a good business with a good future, said Carl Thoma, a partner in the venture capital firm of Golder, Thoma & Cresery, "but it may not be for everybody. Cellular is exciting but it is not risk free."

In other words, some people are going to make money and others are going to lose money in the cellular business. As more and more systems begin to go into operation, judgment day dawns for the many entrepreneurs in the new industry. The enthusiasm that marked the cellular industry in its earliest days is being replaced with the sobriety the cold, hard marketplace always imposes on business pioneers.

The mood and program at the Cellular Communications '84 conference held in Chicago Nov. 26-28 reflected both the promise and risk involved in the cellular business. In terms of the number of attendees and the content of the conference, Cellular Communications '84 was a success. Approximately 350 people registered for the conference, the first cellular conference sponsored by Online Conferences Inc. in the United States. The program covered both the technological and business aspects of cellular communications thoroughly. Question and answer periods following presentations were lively.

The conference reflected an industry in motion, a young industry full of potential.

The potential of cellular is based on its technology, which offers a viable mobile communications medium for large numbers of users. The technology works. In the relatively few large cities with systems on-line, customer response so far has been encouraging. Prices are coming down, which should spur market expansion. In theory at least, the technology can substitute for the landline network, so the potential user population is enormous.

But problems abound, as many speakers emphasized at the conference. The problems can be divided into regulatory and business problems. In general, nonwireline carriers are more vulnerable to both kinds of problems than their wireline competitors. In one key instance, the regulatory and business problems are intimately related. Often, they combine to give wireline carriers a head-start—because their systems are up first—over nonwireline carriers.

'The enthusiasm that marketed the cellular industry in its earliest days is being replaced with the sobriety the cold, hard marketplace always imposes. . .'

Regulating a new technology

The Federal Communications Commission (FCC) regulates entry into the cellular business on the basis of standard metropolitan statistical areas (SMSAs). The FCC has adopted a policy which authorizes two carriers to serve each SMSA. One of those carriers must be a wireline carrier, a telco with presence in the SMSA. The other carrier must be a nonwireline carrier. Authorizations are being gradually doled out by the FCC, beginning with largest SMSAs and slowly extending to the smaller SMSAs.

It is a messy regulatory process, however necessary it is, and it is slow. Because the number of entrants is limited, FCC authorization and, hence, applications which may be authorized or at least lead to a minority position in an authorized partnership, have an intrinsic value. This has led to speculative applications from people who do not intend to go into the cellular business but hope to be cut in on the authorization action. The number of applicants has overwhelmed the FCC's ability to process the paperwork. The FCC used to encourage applicants to negotiate a settlement in markets which had more than one applicant. If a settlement could not be negotiated, the commission would hold a comparative hearing. That process proved to be too

time consuming. Now the FCC urges applicants to negotiate a settlement and holds a lottery to resolve the issue when negotiations fail. This solution tends to stimulate negotiations, but the FCC is still swamped with paperwork, delays are still too long and the application problem is getting worse.

Michael Sullivan, chief of the Mobile Services Div. of the FCC, said that the commission is attempting to minimize regulatory intervention in the cellular business by regulating entry, not price. The lottery should improve the situation because it will encourage competing applicants to reach a negotiated settlement, he said, which is the best way to resolve disputes. Sullivan warned that the FCC intends to reject frivolous and defective applications. The FCC staffer suggested that the authorizations be auctioned. An auction would simplify and expedite the authorization process, he said, but the Communications Act of 1934 would have to be amended before the FCC could hold an auction.

Cellular should be loosely regulated, said Joseph Gillan, director of market structure with the Illinois Commerce Commission (ICC). Regulation has two benefits, Gillan noted: It gratifies regulators and it supervises the first entrant in a market. However, even a complete business failure in a cellular market would impose only small societal costs since the service is a luxury, not a necessity, he said. Therefore, he suggested that cellular be detariffed, or detariffed within specific boundaries, or regulated on a segmented basis. If the market were detariffed, he said, prices would be completely flexible and state regulators would respond only to customer complaints. If a bounded detariffing policy were adopted, state regulators would compel vendors to file price information but prices could float within an approved range, Gillan said. Segmented deregulation, he explained, would require state regulators to divide the industry into transmission and retail segments, and regulate only the former.

The state regulatory situation is marked by its diversity, said Director of Regulatory Matters Phil Forbes of GTE Mobilnet. Some states regulate cellular to varying degrees, he said, and some do not. The potential customers of cellular companies, Forbes said, need less regulatory protection than the general public, he said. The FCC's pro-competitive policy is essentially correct, he said.


The sessions were well attended throughout the conference.

Vice President and General Manager Bob Marino of United Tele-Spectrum reviewed the problems authorization poses for wireline carriers, many of which have to do with how wireline presence is defined. The FCC defined presence as having at least one access line in a given market, he said, a definition which led to some jockeying among companies. However, Marino noted, most Independents did not file for the wireline set-aside in the top 30 markets, although a few of the bigger Independents were granted an equity position in cellular partnerships. The Independents have shown more interest in the smaller markets, he said.

Initially, Independents were content with minority positions in wireline partnerships, Marino said, but increasingly they have been attempting to become operating partners. This has led to problems in concluding settlements, he said, but the threat of having disputes resolved by the blind luck of the lottery has led wireline applicants to negotiate settlements more readily. General partners are responsible for system design and engineering, system implementation and regulatory matters he noted. In the large markets, the wireline operating partner is a Bell operating company (BOC) or a GTE company. In the smaller markets, other Independents are becoming operating partners, Marino said.

Another approach to the authorization problem was suggested by Deputy Chief, Policy Bill Adler of the Common Carrier Bureau of the FCC. He said one way of reducing the number of insincere applications for nonwireline authorization is to require applicants to post a performance bond. The commission also is giving a lot of thought to auctions, he said, echoing Sullivan's comments.

Adler also raised the headstart question. Headstart is not an important problem in large markets, he said, but it will be in small markets which may not have enough capacity to support more than one cellular supplier for 10 years after the first company opens the market. David Irwin, an attorney, agreed.

"Headstart, if sustained, will prove to be an advantage to wireline carriers in the smaller markets," Irwin said.

The authorization process is at the heart of the headstart problem, in Irwin's view. He called for the commission to curb insincere applicants and warned that if the problem is not resolved, legitimate applicants would be reluctant to enter the cellular business. Irwin questioned whether the wireline set-aside is justified. Wireline companies, he said, do not possess a unique ability to serve the cellular marketplace, based either on their experience in other telecommunications markets or their ability to raise the necessary capital.

Pivotal question

"The technology aside," said Tom Lucke, associate director, consulting services, Kalba Bowen Assoc., "cellular is just another business."

President George Perrin of page-

Net seconded Lucke's point and observed that the most important problems now vexing the cellular industry are business problems, not regulatory problems. That is good news, Perrin said.

If business problems are good news, there is plenty of good news in the cellular business, particularly for radio common carriers (RCCs) which have or want nonwireline authorizations. Perrin listed the problems, which include interconnection, roaming and numbering plans, eventually providing nationwide service to non-SMSA areas, solving the 800 megahertz (MHz) issue, settling disputes in nonwireline partnerships, the taxation of traded partnership shares and, always, obtaining nonwireline authorizations. Other business problems include raising capital, market research, marketing, pricing and, of course, what to do about the head-start problem, if anything.

> **'. . .cellular service is an important improvement in communications technology. It is being marketed in a society which has an enormous appetite for communications. . .and is willing to pay to satisfy that appetite. The prices. . .initially were very high. Nevertheless, initial demand. . . has been healthy.'**

Thoma looked at the cellular business from an investor's perspective. Investors, he said, want to know about a company's management capability; the size, competitiveness and growth potential of an industry; a company's competitive edge, profitability and margins; and the anticipated return on investment. Right now, investors generally believe cellular is a high growth industry dominated by large entities, he said. The technology, Thoma said, is seen as a local loop alternative. Investors believe cellular will not be profitable in the near term, he said, and they are unsure when the industry will take off. Investors also are unsure, Thoma said, about how or when to best invest, and they are concerned about the industry's tendency toward management by committee, a result of the many partnerships encouraged by the authorization process. Thoma also said investors think cellular is unusually consolidated for a young industry.

A cellular business plan should include information on market demand, system design and costs, operations, marketing and capitalization, Thoma noted. The market demand information should cover total potential market demand, the relationship between demand and price, rate of customer acceptance, market share projections and usage forecasts, he said.

"System cost is coming down to the point that, relative to marketing and operating costs, it may not be the key component," Thoma said.

Cellular companies tend to underestimate real costs, he said, so they should keep a reserve of capital available to cover the difference. Thoma also warned that cellular companies tend to overestimate demand and then staff the company based on estimated demand. He suggested that cellular companies begin to spend money on planning their operational and marketing activities the way they have been spending on system design. Marketing, in particular, needs more attention, he said.

Success in the cellular business "will take more money and time than probably we all like to imagine," Thoma said. Cellular companies cannot be expected to make money for at least 3 years, he said. However, Thoma predicted that companies will show steadily improving results once they begin to turn a profit.

Lucke noted that equipment manufacturers will compete on a global scale in the cellular business. Manufacturers must compete aggressively, he said, because they are under intense pressure to build market share rapidly so they can drive production costs down. System operators likewise must build their subscriber bases quickly to cover their large initial equipment investment, he said. Therefore, Lucke said, operators must market aggressively. Lucke observed that although initial equipment costs are high, so are the subsequent costs a successful operator will incur. Thus, he said, the initial system design is crucial and must permit the system to be readily expanded at reasonable costs.

Lucke also noted a benefit in the cumbersome authorization process. He said the delay in getting cellular systems up and running will provide the operators in the smaller markets with valuable management and operating experience not available to the cellular pioneers. This accumulated industry experience is one reason cellular will be viable even in the smallest markets, he said.

Contrary to Adler's opinion, headstart is a serious problem even in big markets, according to President Andrew Daskalakis of Cellular Telephone of New York, a nonwireline carrier. Daskalakis noted that in New York City the wireline carrier has been operating since June while his company received its authorization only in October. Therefore, he said, Cellular Telephone has decided to resell service until it gets its system up, probably toward the end of next year. The resale effort will permit the company to establish a customer base and build its distribution channels, he said, as well as acquire experience in dealing with regulators, operating a billing system and interfacing with telcos.

Unfortunately, resale is not profitable, Daskalakis said. "Reselling," he said, "is a defensive measure."

Money and marketing

The growth of the cellular industry will be closely tied to the amount of available capital, said Craig Bouchard, vice president, Communication Companies Div., First National Bank of Chicago. The relationship between the banking community and the cellular industry is unstable, he said. Thus far, most banks "have decided not to take start-up cellular risks," he said. Banks are waiting for cellular companies to establish track records, he said, which will take another 12 months. The banking community believes cellular will be a viable business in the long run, he said, but some short term catastrophes are anticipated. In particular, Bouchard said, banks are concerned about the unpredictability of demand forecasts and

Continued on page 84

PLANT MAN'S NOTEBOOK

Service awards get a new look at Alltel

RAY BLAIN |
Senior Technical Editor

■ When the merger between the former Mid-Continent Telephone Corp. and Allied Telephone Co. occurred, many changes took place to make the company's new name visible. Signs on buildings were replaced, panels on trucks changed over, and even the notepads and other stationery had to be reprinted.

Along with all the other visible items representing the company, service awards jewelry had to also undergo a restyling to incorporate the Alltel name and properly reflect the image of the new company.

"We feel this design captures many good things—the tie to Mid-Continent's past globe logo and the "A" for Allied Telephone," said David Stofka, vice president-personnel. "We think it's a nice transitional piece."

The seemingly simple task of changing the company's service awards was the culmination of almost a year's work. Before the awards were ready to be presented, tasks such as selecting the new emblem design; choosing the type, quality and facets of the jewels in the award; and selecting the type of metal, whether gold or silver, had to be performed.

Designed by the Robbins Co., Attleboro, Mass., the new service awards will premier at the headquarters 1984 Service Recognition Luncheon. Approximately 20% of the corporation's employes system-wide—or 1100 employes—will receive the first collection of Alltel service awards.

This year's service awards will cost the company about $80,000, which is not surprising considering the number of people receiving awards and the cost of jewelry.

■ Dramatic changes are being made to some of United Telephone Co. of Indiana's phone books—both inside and out. No longer are telephone directories merely a resource for names, addresses, and phone numbers. They are taking on the look of a comprehensive resource book reflecting important facts about the community as a whole.

Like other facets of the telephone industry, directories have been re-examined and looked at in a new way. "With the onset of deregulation, telephone companies, like United, have begun to realize the potential of telephone directories," commented Doug Kehler, advertising and promotion manager.

Other firsts for United of Indiana's phone books this year have included the use of the Wander Indiana logo, and the logo and toll-free telephone numbers for Indiana tourist information. All of these changes have two purposes. They provide an expanding source of revenue for United of Indiana and they represent a fresh approach to reaching customers with a wide variety of messages.

■ Some Southwestern Bell managers in St. Louis have gone to the front of the class—a high school class.

The telephone company has joined forces with the St. Louis public schools to enhance the educational opportunities of city school students. As a corporate sponsor of the School Partnership Program, Southwestern Bell is lending managers to Summer High School in north St. Louis to conduct mini-courses in their career fields, such as computer science and public relations.

"We are building tomorrow's work force in today's classrooms," said Wayne Walker, director of volunteer services and external resources in the city schools. "We need to bring the business community into the classroom if we are to present them with an educated and qualified work force at graduation."

The contact with professionals in the classroom ". . . bridges the gap between textbook theory and real life," Walker said.

Southwestern Bell Telephone also sponsors a work-study program with another city high school to teach students office skills and job responsibilities while employed part time at the telephone company.

■ Almost 800,000 residents who have elected to use Wisconsin Bell's inside wire maintenance program will soon notice a slight reduction in their rates. The company has agreed with a Public Service Commission suggestion to reduce the monthly charge for inside wire maintenance from 35¢ to 30¢.

The customers will also have another chance to decide whether they want to have the company maintain telephone wire and jacks on their premises. If they elect not to pay the monthly charge, they may repair the wire themselves or pay a contractor or Wisconsin Bell to do so.

An insert in bills will notify customers that if they wish to end the monthly wire maintenance fee they should fill out and return the form. They will then be responsible for fixing anything that might go wrong with telephone wiring on their premises.

Cross Talk

It costs more today to amuse a child than it did to educate his father.

■ U.S. District Judge Constance Baker Motley has rejected a request from a New York publisher to bar AT&T from printing and distributing 800 number directories without charge. Telecommunications Publishing, Inc., which publishes its own directory of 800 numbers, had filed a lawsuit charging that AT&T was violating antitrust laws by attempting "to monopolize" the market by passing out 1.3 million directories. The judge rejected the suit because it "failed to show irreparable injury" and was "untimely." AT&T has begun distributing the directories.

■ Ameritech has established a $2.4 billion dedicated bond fund to be used as pension benefits for its 43,000 current retirees.

According to William H. Springer, vice chairman and chief financial officer, Ameritech is financing the fund from its $6.4 billion share of the $54 billion in pension assets divided among AT&T and the new regional companies. He said that the fund ". . .will strengthen Ameritech's pension plan and send a strong, positive signal to employes, investors and the financial community."

Springer also said Ameritech will put its remaining $4 billion in pension assets to work in a diversified portfolio to fund pension benefits for future retirees.

■ Digital Equipment Corp., Maynard, Mass., will be participating in the AT&T Communications' "Opportunity Calling for Business" program.

"Opportunity Calling for Business" offers $1 in merchandise credit for every dollar in long distance charges between $15 and $300 per month. Customers can receive an allowance check on the price of selected merchandise featured in an attractive catalog, or a rebate check after the purchase of selected merchandise.

Under the agreement, AT&T Communications will offer Digital's DECmate II word processor/small business system, along with a selection of 11 computer/office accessories.

■ The Iowa Schools & Training Committee has announced the donation of a Northern DMS 10M digital switch to the Des Moines area Community College's telecommunications course.

The switch will be used for both the regular telecommunications students and for other telephone industry personnel. The equipment will be installed this month. Details of future training schedules for Independent telephone company employes are forthcoming.

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We submit our records to the regular scrutiny of the Audit Bureau of Circulations and our circulation practices to the discipline of their regulations.

They report the facts and figures that tell you the exact circulation commodity we offer for the distribution of your sales messages.

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You're never shoe-horned into a communications system that's not right for your size. And, you're always sure of getting the latest technology.

NEC offers you microprocessor-controlled systems with all the newest productivity features—from speed-dialing and handsfree answerback to digital displays that leave you messages. You can choose systems with toll restriction, door phones and programmable alarm zones. You can start with voice alone, then add data, image, text and voice mail as you need them for total office automation.

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LINKING COMPUTERS & COMMUNICATIONS

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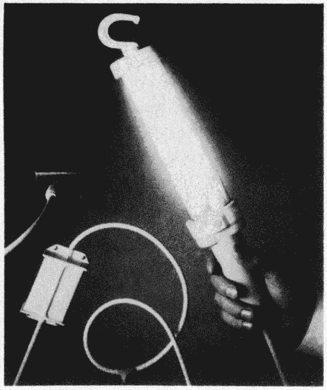
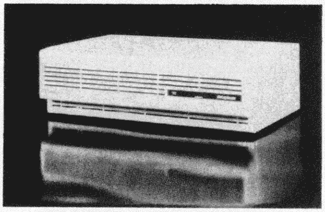
NEW PRODUCTS AND SERVICES



HAND LAMP/This 18 W, U-shaped fluorescent hand lamp can replace conventional incandescent lamps. The U-shaped fluorescent tube is enclosed in a shock-proof butyrate shield which protects against shattering. *Daniel Woodhead Co.*

Reader Service Card No. 170

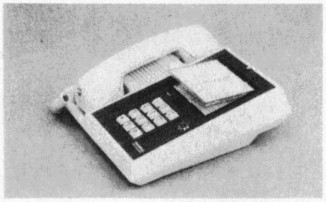


STATISTICAL MULTIPLEXERS/The 330 Dataplexers are statistical multiplexers that support up to 32 channels over 1 or 2 composite links at speeds up to 76,800 b/s. Composite links may be voice-grade cable, microwave, coaxial cable, satellite link or fiber optic facilities. *Tellabs, Inc.*

Reader Service Card No. 171

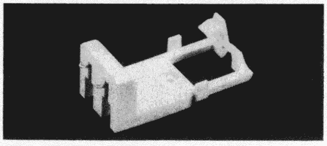
SOFTWARE ENHANCEMENT/The CS-1 cellular mobile telephone has a Mask Rom software enhancement package. The package has repertory memory upgrade from 10 to 30; a 16-digit scroll under dialed number display with retention of the last 7 numbers; transmission muting; and a 1-minute beep tone. The package also has an A/B switch for access to wireline and non-wireline cellular service and repertory DTMF transmission. *Oki Advanced Communications*

Reader Service Card No. 172



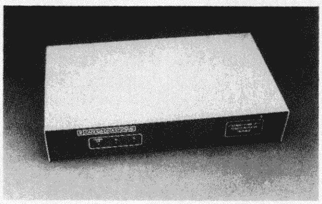
SECURITY TELEPHONE/The TDP-1000-14 is a 40-number memory lockout telephone. A lock on the telephone prohibits any unauthorized phone calls. Tone-pulse switchability allows use on both rotary and pushbutton lines. *Teledial Devices, Inc.*

Reader Service Card No. 173



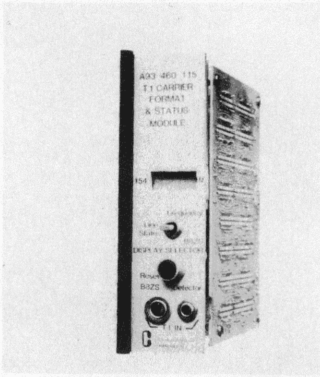
BATTERY HOLDER/The Series 180x is a non-metallic 9 V battery holder. The holder accepts any standard PP3 rectangular 9 V battery. This battery holder comes either with standard solder lugs for wire connects or with printed lugs for plugging directly into the printed circuit board. *Midland-Ross Corp.*

Reader Service Card No. 174



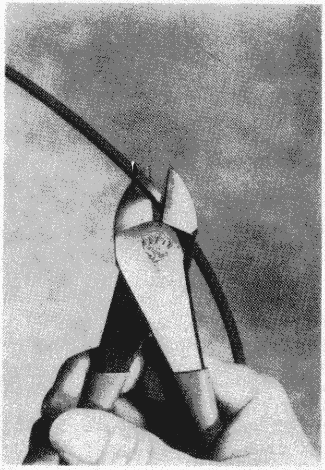
OPTICAL REPEATER/Model CER-802 remote optical repeater is compatible with IEEE 802.3 transceivers. The unit transmits over 1000 M without speed degradation. The repeater can be used on factory floors with large generators or motors in operation, high electrical or electromagnetic interference areas, explosive environments and outside underground installations. *Canoga Data Systems*

Reader Service Card No. 175



MODULE/The T1 carrier format and status module (TFSM) bridges a DS1 signal pair and shows the user whether the signal is in standard framing format or extended framing format. The module displays to 7 digits of precision the frequency of the clock extracted from the signal and shows when bipolar 8-0 substitution (B8ZS) occurs on the monitored pair. *Calculagraph Co.*

Reader Service Card No. 176



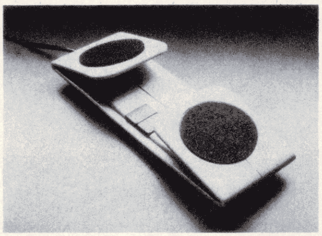
CUTTERS/The 2000 Series includes side cutters, diagonal cutters and an end cutter. The cutters have been designed to cut ACSR, small bolts, nails and most hardened wire without damaging the cutting knives. *Klein Tools, Inc.*

Reader Service Card No. 177

VOICE DIALER/Model VRT-1150 Command Dialer II recognizes spoken words, and matches them with preprogramed words and numbers. Up to 16

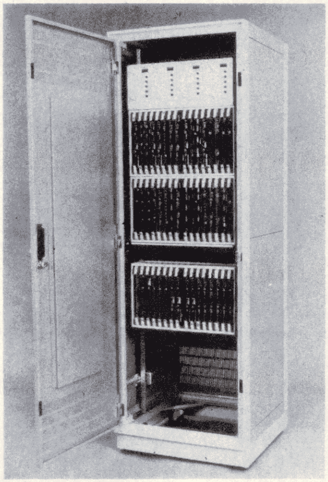
words and phone numbers can be stored in memory. The phone will adapt to the voice commands of users other than the voice that programed it. *Audec Corp.*

Reader Service Card No. 178



VIDEOTEX DECODER/The Tex videotex decoder links the user to a service organization's host computer. Services can include electronic transfer of funds, bill paying, account balance inquiry and bank news and services. Additional uses include closed user networks. *Telelogic Inc.*

Reader Service Card No. 179



DIGITAL NETWORK/The Integrated Digital Network Exchange (IDNX) can terminate up to 32 T1 lines in any configuration. This allows for up to 32 units to be connected to a single unit. The unit can support up to 512 active voice and data circuits. The unit can reroute voice and data circuits around faulty T1 lines without operator intervention. *Network Equipment Technologies*

Reader Service Card No. 180

SOFTWARE/The DCS-300 software provides access to ITT services via communicating personal computers. The software supports ITT's interactive telex and directory services and provides a message editor to permit creation of messages offline. The package works with modem-equipped IBM and ITT XTRA personal computers and similar compatible microcomputers. *ITT Communications Services, Inc.*

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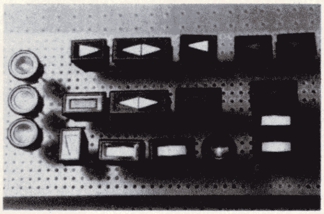

LED INDICATORS/The ME351-MP series consists of LED indicators. The indicators come in 4 styles and 3 colors. Styles include directional, bidirectional, round and rectangular indicators. *Mouser Electronics*

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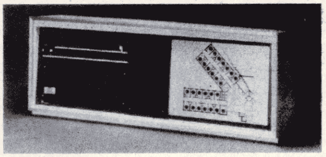
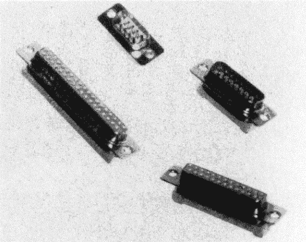


COMMUNICATIONS SYSTEM/The Correctional facility communications sys-

Continued on page 78

tems have graphic displays and pushbutton operation. Central consoles can provide communication to an unlimited number of cells or remote stations. Modular plug-in construction allows for system expansion. *Dukane Corp.*

Reader Service Card No. 183

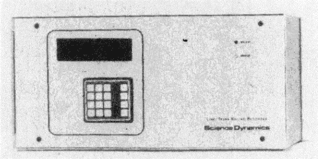


CONNECTORS/These metal shell D-subminiature connectors, Series 4600, come in yellow chromate finish or a tin finish with raised contact dimples for positive continuity from shell to shell. The connectors are available for plug and socket configurations with 9, 15, 25 and 37 contacts, providing mass termination of standard 0.050 in. pitch ribbon cable. *H&T Components Inc.*

Reader Service Card No. 184

NUMBER DISPLAY/This MF receiver with LCD display shows the phone number of the calling subscriber at an emergency reporting center. A full 10-digit number is displayed with a 2-number memory. The box wires into existing key set or phone and an RS-232 connection provides ASCII output of ANI. *TCI, Inc.*

Reader Service Card No. 185

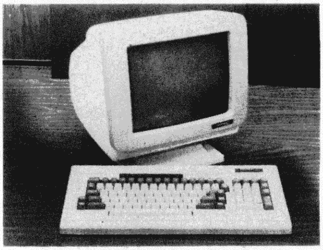


RATE BILLING/This 2-party message rate billing is for lifeline services to the ACT II Access Measurement System. With the service, the user is typically allowed a fixed number of local calls per month at a flat rate, with additional calls being billed per call. The system may also be used for access charge and WATS billing. *Science Dynamics Corp.*

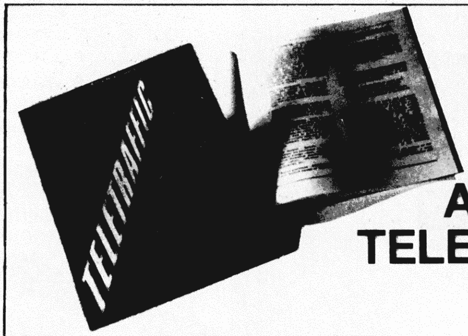
Reader Service Card No. 186

MODEM/The GL1110 data link radio modem provides data transmission through degraded channel conditions experienced in low power VHF and UHF radio links. The modem can be used for point-to-point and networked radio data communication system. With additional link and DTE protocols, the modem can be used for mobile radio data communication applications. The unit is suited for narrow band FM radio channels and can be used as a stand-alone unit or as a Eurocard plug-in package. *Glenayre Electronics*

Reader Service Card No. 187

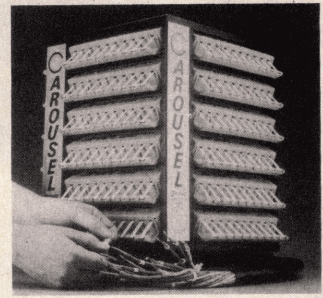


VIDEO TERMINAL/Model DS7 Data D-Streamer is a serial ASCII video terminal designed to sort streaming data by user-selected key words functioning as data headers and terminators. When a header is recognized in the data stream, the header and the following data are sent to the printer port until the terminator is recognized. Applications include sorting data from streaming data sources such as



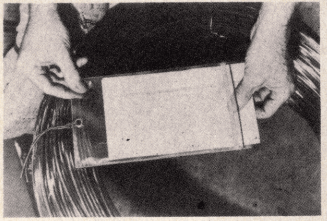
the weather service, stock exchange and commodity service, corporate branch office communications and scientific and military data transmission. *ABC Systems Inc.*

Reader Service Card No. 188



ROTATING CONSOLE/The Carousel is a rotating console with 24 wire-marking dispensers. The unit rotates to allow accessibility to the markers on all 4 sides. Each side holds 6 modular dispensers with 10 tapes, for a total of 240 different legends. *Ziptape Identification Systems*

Reader Service Card No. 189



TIE-ON ENVELOPES/These tie-on envelopes allow the user to tie warnings, instructions or other important information to the equipment or workstation where needed. A zipper closure allows for access and replacement of the information. *Associated Bag Co.*

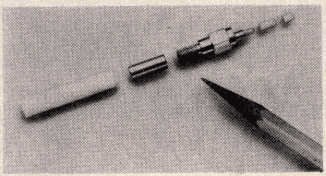
Reader Service Card No. 190

SPEECH SYNTHESIS PHONE/The SS-100 is a speech synthesis phone that performs the functions of both a memory dialer and an answering machine. The user can program the phone to give callers messages stating that he is unavailable, that he can be reached at another number or that he can be reached at another number at a certain time. The SS-100 can also be used with a tape recorder, giving all the above messages, and also giving the caller the option of leaving a message. *Technico (USA) Corp.*

Reader Service Card No. 191

WORKSTATION/This workstation combines an integrated electronic telephone and an electronic typewriter. The workstation provides call distribution, telex capability, incorporates a computer modem and handles electronic mail. Up to 8 telephone lines are directly integrated. *Crystal Technologies Corp.*

Reader Service Card No. 192



FIBER OPTIC CONNECTOR/The Series 232 SCSM single mode FO con-

Continued on page 81

This is the Book You've Been Waiting For:

Defining
14,500
telecommunication words and terms

It's hard to keep up with events and changes in the telecommunications field these days. This new book will help by fulfilling a basic need—an understanding of the *new* language of telecommunications. Yes, there *is* a new language. Because the field is almost as new now as it was 106 years ago when the telephone was invented.

You've all heard of the marriage of computers and communications. This book, in part, was made necessary by that marriage, which, of course, now has been consummated and is producing a confusing array of progeny. The DICTIONARY will go far toward ending the confusion. In it, the telephone engineer can find the definition of "byte," and the computer specialist can find the definition of "centrex."

Those are two of the 14,500 words and terms in the 315-page book. It is a specialized book— every word has to do with telecommunications. Yet it is a general reference work because the words and terms are drawn from all of the many fields that now affect telecommunications: telephony, of course; computers; satellites; radio; special transmission media and techniques—all are here. All have been carefully compiled, researched, compared and defined in a massive two-year effort by Graham Langley, widely traveled engineer and executive, who has spent 40 years learning and working with the intricate details of telecommunications systems. That knowledge all has been brought to bear in the writing of this book.

Here are the highlights of the DICTIONARY'S contents:

- Dictionary of 14,500 telecommunication words and terms

Plus these appendices:

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- Telephone signaling systems
- Switched data services
- World Administrative Radio Conference (WARC)
- Submarine cables
- Classification and designation of radio emissions
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nectors have lapped ceramic capillary ferrules with $1\ \mu$ concentricities. A 0.250 in. long precision hole in the ceramic ferrule ensures fiber parallelism. *Optical Fiber Technologies, Inc.*

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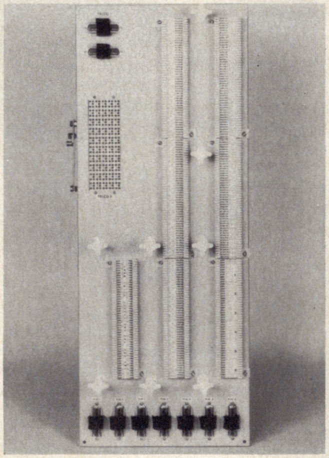
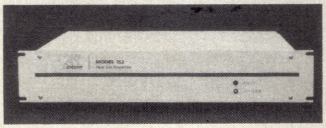


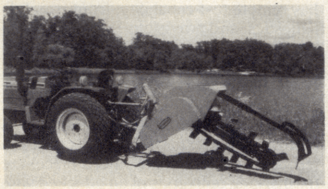
DISTRIBUTION FRAME/The SX-100 main distribution frame is configured for 112 prewired ports and 6 defined power failure positions. The unit is prewired and uses cold rolled steel to avoid the static damage that plastic base plates may cause. Built in safeguards protect EPABX systems from excessive voltage. *MDF Inc.*

Reader Service Card No. 194



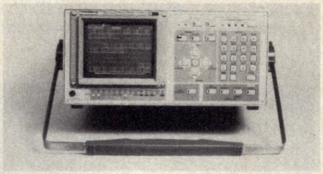
RESPONDER/Model 152 responder functions as an originating Code 105 transmission test line when used with a host PBX. The responder uses the direct trunk selection features of the PBX via an optional 2-wire maintenance port test connection. The unit supports both autorouting and demand testing instructions from an external controller over an RS-232 interface. *CXR Telecom*

Reader Service Card No. 195



TRENCHER/This 3-point hitch mounted PTO driven trencher is for small tractors equipped with hydrostatic transmissions or creeper gears. Trenching widths include 4 in., 5 in., 6 in., 8 in., 10 in. and 12 in. The trencher also has 2.5 ft., 3 ft., 4 ft., 5 ft. and 6 ft. depths and dual pivot action. *American Trencher Inc.*

Reader Service Card No. 196

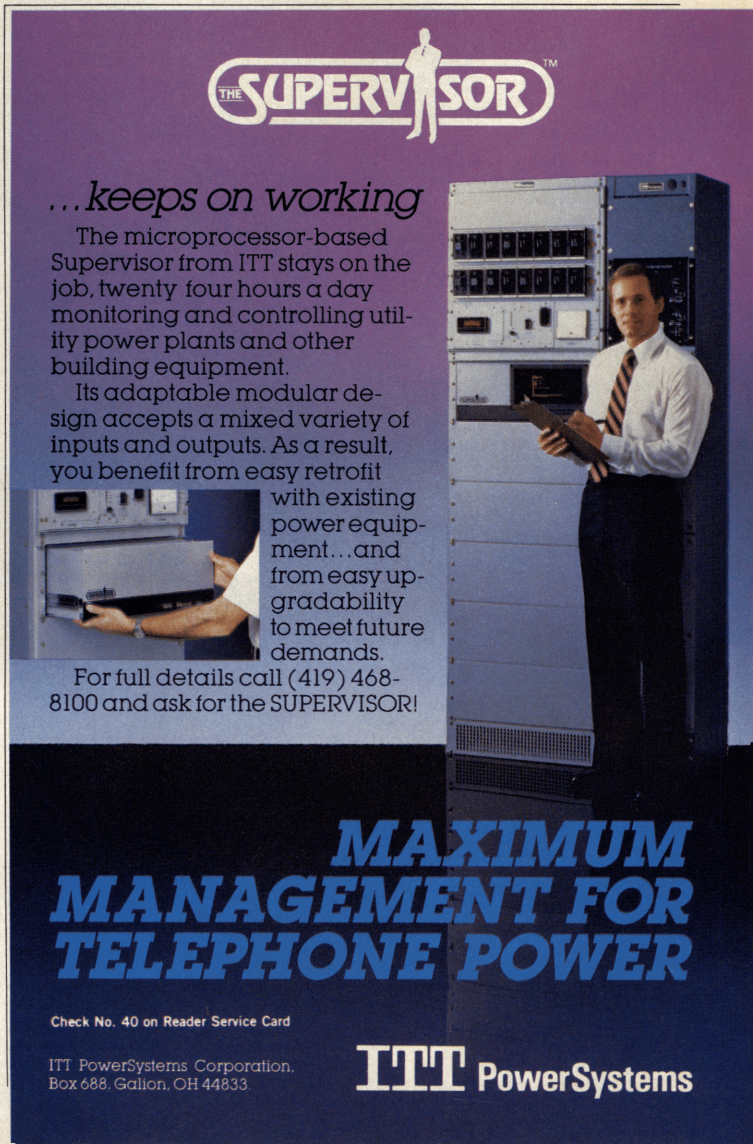


PROTOCOL ANALYZER/This portable protocol analyzer, Model VP-3682P is a line diagnostic instrument for troubleshooting and analysis of faults in data communications network systems. It can record and store data into its built in memory and display it on the CRT screen without affecting the on-line status. *Panasonic Industrial Co.*

Reader Service Card No. 197

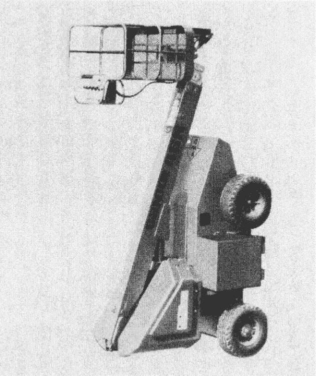
SPLICING KITS/These two splicing kits can be used to repair single and multi conductor cables and power cord sets. One of the kits uses a heat shrinkable insulating sleeve with a sealant that provides 1000 V per mil insulation property. The other uses a neoprene sleeve or tape and

Continued on page 82



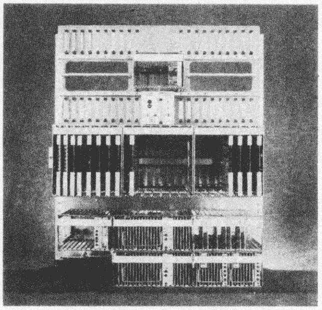
provides a watertight splice with an insulation value of 5000 V. *Duraline, Div. of J.B. Nottingham & Co., Inc.*

Reader Service Card No. 198



AERIAL WORK PLATFORM/This zero tail-swing 46N electrical aerial work platform has electronic battery power and optional 3-section boom. The optional 3-section boom reduces the machine length by 6 ft. and enables operation in less space. The unit comes standard with a 25 hp electric motor and uses 72 Vdc, 575 amp/hour batteries connected in series. *Calavar Corp.*

Reader Service Card No. 199

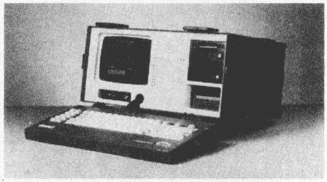


NETWORK CONTROLLER/The Western Electric Customer Network Controller lets the customer directly control the digital cross-connect capability of the Digital Access and Cross-Connect System. The controller includes features for the customer and the telco. Customer features provide an interface to the Customer Network Controller and allow the customer to exercise digital control over cross-connections in DACS. Telco features allow personnel access to the system for assigning new customers and their DACS terminations, for monitoring the database integrity and for performing other maintenance functions. *AT&T Network Systems*

Reader Service Card No. 200

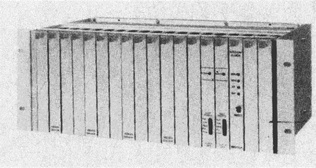
SOFTWARE PRODUCTS/The UNIX Blast communications software products provide error free file transfer and terminal access to link UNIX systems with any other computers running Blast software. The software is available for over 100 computers, including DEC VAX (VMS) and PDP (RSX), Wang (VS), and Hewlett Packard 3000 (MPE) and 1000 (RTE). *Communications Research Group, Inc.*

Reader Service Card No. 201



PROTOCOL TESTER/The Chameleon II data communications protocol simulator/analyzer offers a real time clock board and 15 protocol support software packages. Software programs designed to perform with the real time clock board include synchronous data link control statistics, X.25 statistics and direct-to-disk analysis. *Tekelec, Inc.*

Reader Service Card No. 202

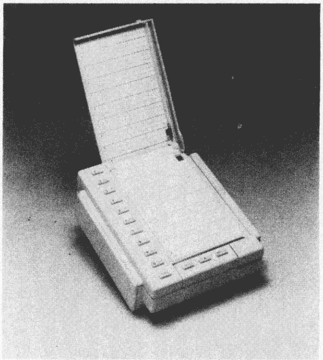


STATION CLOCK/The GDC Station Clock Facility is a multiplexer with the station clock facility. This Network Timing dictates that all timing within a synchronous digital network be slaved and locked to a single frequency reference. The unit can serve as the master clock for the network or lock onto an external timing source. *General DataComm Industries, Inc.*

Reader Service Card No. 203

TEST SET/Model TS21-080 test set has a water resistant keypad and switch protectors and solid state circuitry for protection against high currents. The test set has increased receive levels and monitor levels and DTMF signal levels compensating for loop length. The test set also has tone and pulse operation, polarity test buttons and LEDs. *Harris Corp., Dracon Div.*

Reader Service Card No. 204



INDEX DIALER/The Linkit index dialer stores up to 420 telephone numbers in an automatic dialer. The dialer combines 1-button memory dialing with a directory that allows the user to enter names, addresses and telephone numbers alphabetically. To dial a call automatically, the user opens the directory to the proper section of the alphabet, locates the name, and presses the button alongside the entry. *Buscom Systems*

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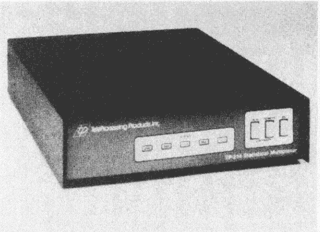

STATISTICAL MULTIPLEXER/The TP-214 4-channel statistical multiplexer is designed for networks using asynchronous terminals or a mix of synchronous and asynchronous terminals. The device allows the user to connect 4 asynchronous terminals with input speeds from 110 b/s to 9600 b/s to a synchronous modem. The device can also be connected to 1 or more ports of a multiport synchronous modem or to a DSU. The device has remote test capability, front panel diagnostics, and provisions for the use of X-on, X-off signals to prevent buffer overruns. *TeleProcessing Products, Inc.*

Reader Service Card No. 206

WIRE MARKER/This wire marker is perforated into 3 parts. The first part is a terminal marker and the other 2 pieces are for marking both ends of an attached wire as small as 0.040 in. without flagging. The complete marker will encompass a 0.350 in. OD cable. *Datak Corp.*

Reader Service Card No. 207

Continued from page 71

the complicated ownership relationships prevalent in the industry.

The interconnection problem faced by nonwireline carriers has been exacerbated by the telephone industry's concern with the access charge concept, argued Attorney Richard Tettelbaum of Fortas & Hardman. He said economic relationships should be bilateral and that there are three alternatives: joint ownership of interconnecting facilities; distributing the cost of interchange facilities according to the relative traffic shares of the interconnecting companies; finally, the originating company could pay the terminating company for the costs of carrying the traffic. Telcos treat cellular carriers as "a mere appendage" of the network, Tettelbaum said, when they should treat cellular carriers as part of the network.

Buffalo Telephone Co., a nonwireline carrier serving Buffalo, N.Y., has built a good working relationship with New York Telephone Co., General Manager and Chief Executive Officer Dennis Rooney explained, by trying to work with the telco. Telcos often are suspicious of RCCs, he said. Telephone industry jargon also is hard to understand, Rooney said, which creates an additional barrier.

However, establishing a good relationship with telcos is absolutely necesary for nonwireline carriers, Rooney said. Telcos have motivated, qualified people anxious to prove they can master the new environment, he said, as well as superb equipment. They also possess experience in dealing with regulators and engineering expertise RCCs lack, he said. Telco personnel are not obliged to share their expertise with RCC personnel, Rooney said, but they will be helpful if the telco and the RCC have a good relationship. RCCs should work hard to establish a cooperative relationship with telcos, he said.

Good research is essential to the development of a good marketing program, said Sheila Griffin, general manager, Market Research & Information, Ameritech Mobile Communications. It is important to do ongoing market research, she said, so shifts in the market do not catch the operator out of position. This is particularly important in the cellular industry, Griffin said, because of its dynamism. Different people than the original customers now are interested in using cellular service, she said, and the company must change its marketing effort to inform and sell these new potential customers.

Sheila Griffin, general manager, Market Research & Information, Ameritech Mobile Communications, waits for a speaker to answer her question. Griffin also addressed the conference.

Albert Grimes, vice president and general manager of Cellular One, the nonwireline carrier in the Washington-Baltimore area, discussed marketing in that highly competitive market. Cellular One was up 4 months before its wireline competitor, he said, so there was not a problem with wireline headstart. The company has used an expensive, aggressive advertising campaign to keep its lead in the market, Grimes said. Much of the advertising has been devoted to differentiating the vendors, he said. The company uses direct sales techniques, he said, with most of the sales coming from a relatively small number of dealers.

In one of the last presentations of the conference, Vice President and General Manager Stan Krejci of Metrocall, one of the partners in Cellular One, described the synergistic relationship among cellular, conventional mobile communications and paging services. By stimulating network usage, cellular has helped increase the traffic and profits of all telecommunications companies, he said. Furthermore, people in the market for one kind of communications service often are interested in and can be sold on a second service, Krejci said.

The big question

The question haunting entrepreneurs in the cellular industry is easily stated and seemingly impossible to answer. How much demand will there be?

No one knows for certain. People who think they know do not talk about it.

What is known is that cellular service is an important improvement in communications technology. It is being marketed in a society which has an enormous appetite for communications of all kinds and is willing to pay to satisfy that appetite. The prices of cellular systems initially were very high. Nevertheless, initial demand in the first large urban markets has been healthy. As production costs come down and retail prices follow, demand is expected to increase.

So, cellular is expected to be profitable.

But for which companies in which markets when? Will it be profitable in smaller urban areas? In suburban areas? In rural areas? Will only wireline carriers be able to make money in certain markets?

Little hard data is available. No new data was offered at Cellular Communications '84. Some people declined to answer specific questions on their companies' demand projections. Thoma suggested from the podium that people interested in hard demand data read an article entitled, "Chasing the cellular rainbow" by LeRoy T. Carlson Jr. of Telephone & Data Systems (TDS), and H. Donald Nelson and Gary L. Henshue of U.S. Cellular Corp., a TDS subsidiary, which was published recently in this magazine (TELEPHONY, Nov. 19, p. 32).

Demand is the key issue. It formed the foundation for the many interesting discussions at the Chicago conference, as it forms the foundation for all cellular planning. But it is not discussed in any detail in public. Everybody in the cellular business is left speculating.

As speakers at the conference discussed, there are a lot of problems in bringing cellular service to the consumer, not the least of which has been dealing with the FCC's authorization process. But the cellular industry now is entering a market driven phase. Operators continue to fight for the right to serve customers but increasingly the industry's attention will focus on consumer behavior, not the engineering challenges or prestidigitation at the FCC.

Cellular Communications '85 will be held at the New York Hilton, Oct. 28-30, 1985. It will feature a 3-day conference and an exhibition, which the 1984 conference lacked. By then, the cellular industry may have a better handle on its future. But perhaps it won't. There is a lot of uncertainty in the cellular business and one monumental variable.

What will consumers do? ☐

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CIRCUIT NOISE
POWER INFLUENCE
LINE CURRENT
LOOP AROUND TEST

2. TEN TONE GENERATOR

304 Hz
404 Hz
504 Hz
750 Hz
1004 Hz
1750 Hz
2804 Hz
3004 Hz
3204 Hz
4804 Hz

3. VOLT-OHMMETER

DC VOLTS: 0-60-300
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OHMS: 0-1k-100k-1MΩ

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CIRCUIT NOISE
POWER INFLUENCE
LINE CURRENT
LOOP AROUND TEST

2. 17 TONE GENERATOR

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404 Hz
504 Hz
750 Hz
1004 Hz
1750 Hz
2804 Hz
3004 Hz
3204 Hz
4804 Hz
1070 Hz
1270 Hz
2025 Hz
2225 Hz
2700 Hz

Two Programmable Frequencies
(Tones can be sent through either set of test leads)

3. VOLT-OHMMETER

DC VOLTS: 0-15-60-300
AC VOLTS: 0-60-300 TRUE RMS
OHMS: 0-1k-100k-1MΩ-10MΩ-100MΩ

4. 8455 TEST SET CAPABILITIES

DC VOLTS: 0-60-300 (2500 Ω/V)
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POLARITY REVERSING SWITCH
INSULATION TESTING

the four-in-one telephone tester

Now, one compact multi-function unit provides the equipment installer a transmission test set with a circuit loss range and tone sending capability of −50 to +13dBm with the ±10dBm switch, a 17 frequency tone source including 2713 Hz (tones can be sent through either tone or transmission test leads), an expanded volt-ohmmeter adding 15VDC, polarity reversing switch, 10MΩ and 100MΩ and 8455 type insulation testing. The scale is color coded in red, yellow and green for ease in reading and uses the 310 type plug and Western Electric style alligator clips for ease in use.

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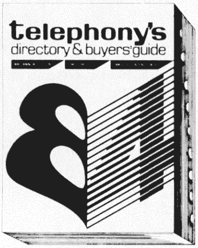


Universal Communication Systems, Inc. (UCS), an interconnect company based in Roanoke, Va., recently celebrated its 15th anniversary. The company is primarily involved in the sale, installation and maintenance of digital private branch exchange systems. Here, W. Thomas Craig (l) executive vice president of UCS, and Frederick J. Shaftman, UCS president, congratulate each other before cutting an anniversary cake.

Continued from page 13

Douglas Ruhe concerning the establishment of a partnership for direct broadcasting satellite (DBS) services. COMSAT also has restructured its approach to this area of business.

"Our best evaluation of the proposed business arrangements has led us to the conclusion that the market and financial risks associated with this approach are unacceptable for COMSAT," Joseph V. Charyk, COMSAT Chairman and Chief Executive Officer, said. "We continue to believe in the potential of the commercial activity involving direct delivery of entertainment and information to the home via satellite and we will continue to explore an appropriate COMSAT role in this business area that is consistent with acceptable business and financial risks.

COMSAT will retain Federal Com-

Continued on page 90

TELEPHONY 'special' issues—call for articles

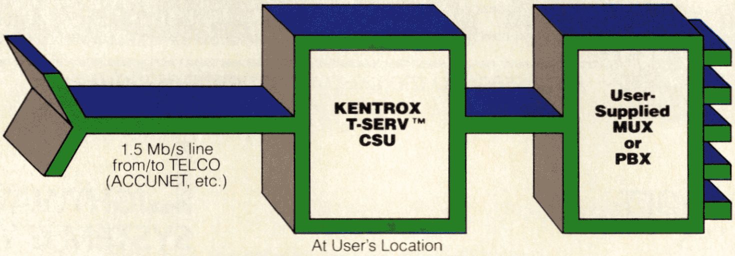
Authoritative telecommunications articles are welcomed by TELEPHONY editors and our global audience of telecommunications professionals.

While some of TELEPHONY's 52 issues per year—53 in 1984!—highlight a single subject, all issues are "open" to accommodate the tremendous variety of subjects vital to the dynamic telecommunications industry.

For more information on publishing articles, please contact the editor.

Subject	**Deadline**
International	
World Telecommunications Review and Forecast	
Preview: Communications Tokyo 85	
Preview: INTELEXPO 85 (Washington)	Dec 24
Local Distribution (Subscriber Loops and Bypass)	
Technologies and Applications	Jan 14
International	
Business Communications	
Preview: Asia Telecom 85 (Singapore)	
Preview: Communications London	Jan 28
Public Network Services For Business Communications	
Preview: ICA 85 (Dallas)	Feb 18
International	Feb 25

GETTING ACCUNET*? YOU'LL NEED THIS NEW CSU FROM KENTROX



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- Complies with telco specifications for High Capacity, Digital Service Channel Interfaces.
- Is a cost-effective alternative to 551A-type units while providing many important improvements.
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The T-SERV CSU responds to conventional telco-controlled dc or the newer in-band (digital code) loopback. An integral test option allows local loopback to test local circuitry. And if the far end has similar equipment, **the user can test the complete leased transmission circuit end-to-end.** Potential problems are quickly isolated so down time is minimized. LED's indicate power, test, and loopback status.

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UPDATE

A message to the telecommunications industry

NEW LMOS SOFTWARE CREATES "PAPERLESS" OFFICE

A Southern Bell Maintenance Center is virtually "paperless" today, thanks to Generic 4 of the Loop Maintenance Operations System (LMOS-2).

Southern Bell and AT&T Network Systems recently concluded a trial of the newest LMOS-2 generic in Green Acres, Florida. As a result, the maintenance center there is also a less costly, more efficient operation, according to Southern Bell managers. That's because the new system offers a number of innovative features that expedite the processing of trouble reports and reduce the labor involved.

"From an operational standpoint, the unsung hero of Generic 4 is the creation of work queues," said Maintenance Administrator Paul Smith. With electronic work queues, made possible by the Mechanized Screener feature, "the maintenance center manager can immediately tell what particular status the troubles are in and react to the situation more quickly," Smith noted.

Maintenance Center Manager Lee Carhart echoed Smith, adding that the Mechanized Screener and Automated Screener features "combine to significantly increase efficiency of the overall screening function."

Streamlined Operations

The system's Automated Screener feature makes basic decisions automatically, eliminates screening bottlenecks, and speeds the processing of trouble reports. Another useful feature, Routine Ticket Entry, allows for the automatic dispatch of routine work, speeding up the total repair process.

Used in conjunction with LMOS-2 Generic 3, the Generic 4 software provides maintenance centers with "flowthrough". This means maintenance center processing of trouble reports can be accomplished with minimal human intervention. Studies show that, when used together, the two software packages reduce maintenance center personnel by at least 13 percent.

Generic 3 of LMOS-2 is now available, and Generic 4 features will be offered the first quarter of 1985.

The Next Step

Flowthrough also is a prerequisite to AT&T's Craft Access System, which will also be available in 1985. This system will allow craft personnel direct access to operations systems by means of hand-held terminals. In the system's initial application—with the Automated Repair Service Bureau (ARSB)—repair technicians will be able to receive and close out jobs, perform tests and store dispatch information and test results from the field.

LIGHTWAVE SYSTEM IS WORLD'S FASTEST

AT&T Network Systems, in partnership with AT&T Bell Laboratories, has developed the fastest commercial lightwave system, the new AT&T FT Series G system.

The first phase of the new single-mode system, which will be available next year, will operate at a rate of 417 megabits per second. Components available by 1988 will upgrade system operation to 1.7 gigabits per second, the fastest transmission rate ever offered for commercial use. The FT Series G system can operate at either rate using the same optical fibers, the same basic terminal equipment, and the same repeater spacings, which can stretch as far as 24 miles.

Designed for Easy Upgrading

Not only will this new system offer the option of upgrading transmission rates, it will also use much of the same equipment to provide a starting point of 6,048 circuits per fiber pair at the 417 Mb/s rate and the potential for 24,192 circuits per fiber pair at the 1.7 Gb/s rate. That's more circuits per pair than has ever been possible before.

When components are available for the 1.7 Gb/s system, upgrading will be a simple matter of replacing some equipment in the central office and installing higher capacity regenerators at line repeater locations.

The Loop Maintenance Operations System (LMOS-2) has effectively eliminated the paperwork at Southern Bell's Maintenance Center.

ROUNDUP: 5ESS switch containing two-millionth customer line shipped to Nelsonville, Ohio in November ... Cellular phone service launched in Cincinnati, Ohio 12/5/84 with cutover of AT&T's AUTOPLEX™ System 100 ... New 200 Network Interface Unit — adaptable for every outdoor application as well as future growth — available now ... See how AT&T's Building Distribution System can give you excellent intra-building and on-premises networks when the system is displayed at 13th Annual BICSI Conference in Tampa, FL, Jan. 21-24.

For more information about the subjects and products featured in this issue, contact your **AT&T Network Systems** Representative.

With this potential for growth, the FT Series G system answers the industry need for increasingly high-capacity digital transmission of voice, video, graphics and data.

Advanced Technologies Mean Savings

The new system uses lasers that operate at wavelengths of 1.3 microns and transmit the laser light over single-mode optical fibers. This combination results in extremely low line loss that increases spacing between regenerators. With greater spans between regenerators, equipment and maintenance costs are lowered significantly.

Large Scale Integrated circuit chips used in the system also help to reduce operating costs. Earlier systems required many more circuit packs. The FT Series G uses advanced circuitry, which permits a single equipment bay to house as many as four 417-megabit lightwave terminals, providing previously unequaled space savings, flexibility and growth potential, in addition to reducing equipment costs.

NEW 5ESS™ SWITCH FEATURE FOR INDEPENDENT TELCOS

AT&T's recently-developed 5ESS switch feature for Independent telephone companies, Frequency Selective Ringing (FSR), saw its first application in Spencerport, 20 miles from Rochester, NY, in mid-September.

It is just one in a series of special features being developed by AT&T Network Systems to adapt the 5ESS switch to serve the particular needs of Independent telephone companies.

The Frequency Selective Ringing required by some Independent telcos differs from that supplied on the standard 5ESS switch. These ringing frequencies often differ from office to office, at remote switching modules, or even within switching modules.

Now, because the FSR feature makes a wide range of ringing frequencies available, Independents can take full advantage of the many benefits offered by AT&T's advanced digital switch. This is yet another demonstration of the flexibility of the 5ESS switch, and AT&T's continuing efforts to respond to the individual needs of its customers.

AT&T

Continued from page 86

munications Commission DBS authorizations and complete the two high-powered satellites currently under construction for this or related types of applications.

As a result of the termination of negotiations with Prudential, the company will significantly reduce its Satellite Television Corp. subsidiary expenses.

SBS to expand network

Satellite Business Systems (SBS) will expand its national long distance network to Tampa, Fla., beginning in January 1985. A new SBS earth station in Tampa will provide three interstate services—Skyline WATS (wide area telecommunications service), Skyline Toll-Free and Skyline Network Service. Skyline Long Distance service will be offered in mid-1985, after installation of a digital switching center in Tampa.

SBS is located in McLean, Va.

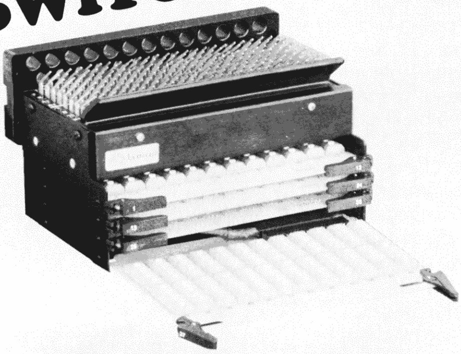
Mitel sells Vermont facility for $5 million

Mitel Corp. has sold its semiconductor manufacturing facility in South Burlington, Vt., for $5.1 million to Semicon Components, Inc., of Burlington, Mass.

The Mitel facility had been closed since September 1983. Mitel first occupied the building in June 1982, manufacturing sem-

Continued on page 93

Iwatsu America Inc. has moved into new headquarters in Carlstadt, N.J. Shown at the official opening of the new facility are (l-r, first row): Shinji Hiyashi, president, Iwatsu Electric Co. Ltd.; Yasuo Morimoto, president, Iwatsu America Inc.; and Robert Beck, assistant vice president-engineering support services, Iwatsu America Inc.; (l-r, second row) Makoto Ueno, vice president-engineering, Iwatsu America Inc.; Seizaburo Yasutomi, vice president-manufacturing, Iwatsu America Inc.; Hideo Shibuya, manager-overseas operation, Iwatsu America Inc.; Kenichi Kashimura, vice president-finance, Iwatsu America Inc.; Robert Chrostowski, vice president-operations, Iwatsu America Inc.; Paul Gotter, assistant vice president for midwestern and western sales, Iwatsu America Inc.; and Leonard Berman, assistant vice president, telco sales, Iwatsu America Inc. Iwatsu America Inc. is the U.S. distribution and marketing arm of Iwatsu Electric Co., Ltd., a Japanese firm.



"I chose Wiltron's CMTS for private line testing for three reasons. Capability. Price. Support."

"For telcos, it's a competitive world out there. One where a bad investment in a private line test system can cost plenty—today, tomorrow. . . and for a long time to come.

"I can't afford that kind of mistake. So I chose Wiltron's Centralized Maintenance Test System. Here's why.

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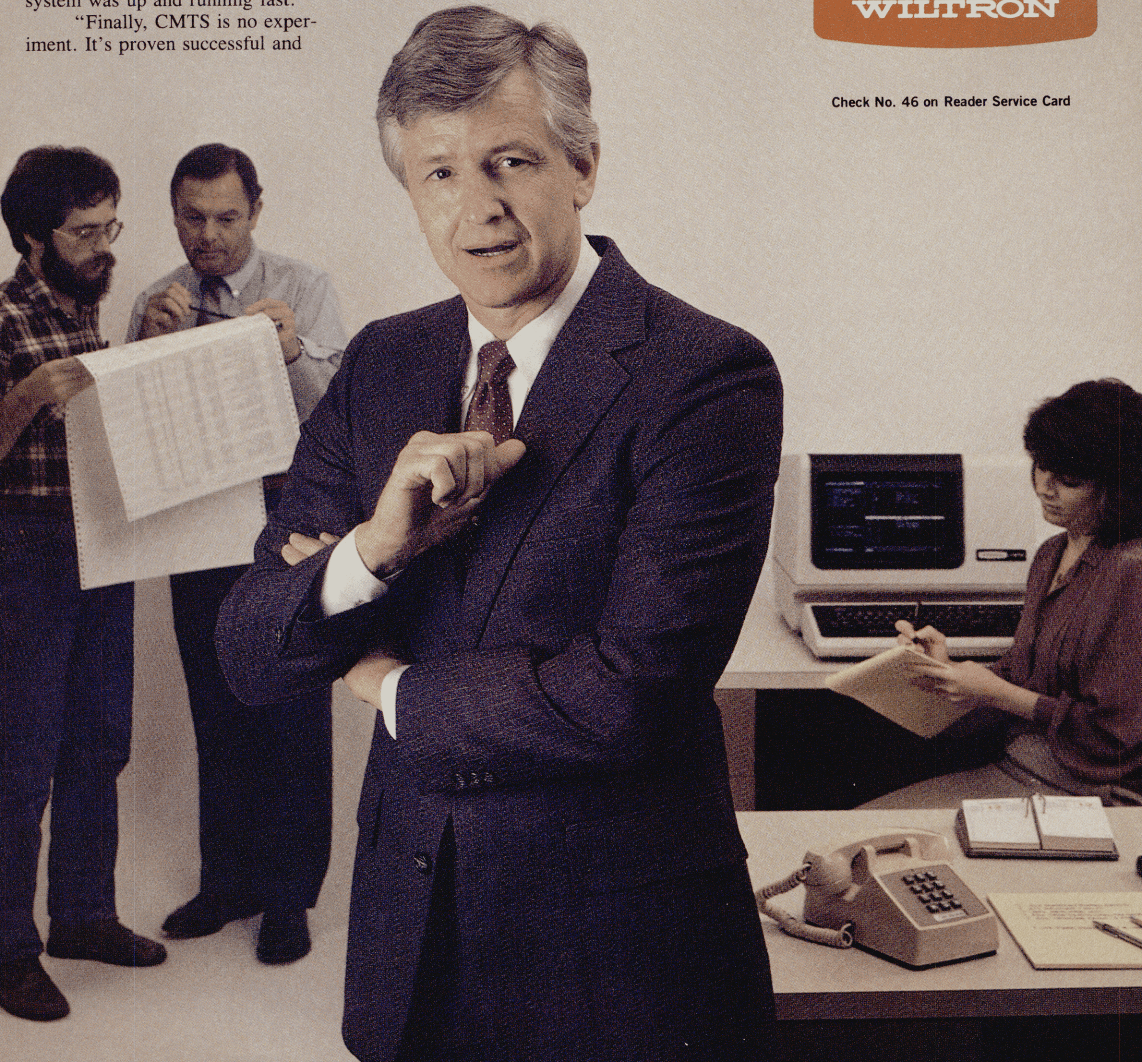

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Western Telemarketing

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Making good on the promises of telecommunications.

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Continued from page 90

iconductors and thick-film hybrid circuitry for use in its Superswitch private automatic branch exchange (PABX) telephone switching systems and for sale as individual products. The facility was shut down because of improved efficiencies in other Mitel facilities and excess manufacturing capacity in the semiconductor area.

Semicon will use the building for the manufacture of various semiconductor devices.

Mitel is located in Kanata, Ontario.

Souris River Tel adds Stromberg equipment

Stromberg-Carlson Corp. has placed in service a 3544-line System Century digital central office for the Souris River Telephone Co. of Minot, N.D. The installation marks the completion of the first segment of a $1.7 million network of remote switching systems. The network will provide local service to eight outlying rural communities on the banks of the Souris River in the northern part of the state.

Stromberg-Carlson Corp., a Plessey Telecommunications Co., is located in Lake Mary, Fla.

AT&T Communications starts Montana POP

AT&T Communications of the Mountain States and Mid-Rivers Telephone Cooperative, Inc. have entered into an agreement under which AT&T Communications has established a Point of Presence (POP) at the Mid-Rivers toll switch in West Glendive, Mont. This is the first such step taken by AT&T Communications since divestiture to expand its POPs anywhere in the Rocky Mountain area.

Mid-Rivers Telephone Cooperative is based in Circle, Mont.

Lanier begins distribution network

Lanier Business Products, Inc. has implemented a nationwide distribution network for its line of business telephone and private branch exchange (PBX) products.

The company produces three business phone system products-the Series VI, Series XII and Series XX, as well as a line of small business phone systems, the Series III. The company also markets the Harris 110 PBX.

Lanier Business Products, a Harris Company, is located in Atlanta.

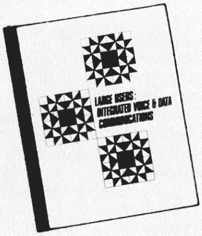
AT&T Communications asks to test credit billing

AT&T Communications has filed a proposal with the Minnesota Public Utilities Commission to test four new billing policies for long distance service. About 1.3 million customers would be included in the 1-year test, which would begin in March 1985. AT&T Communications would issue a separate bill for long distance services, and would eliminate the requirement for deposits for those services.

One plan makes no changes in the current method of payment, so AT&T Communications can compare reactions to different payment plans. This would be available to about 10% of AT&T Communications' residential customers, or about 100,000 customers. They would continue to pay their bills as they do now, although payments would be made directly to AT&T Communications rather than to Northwestern Bell.

Two other plans would cover most residential customers. One plan would allow a minimum monthly payment of $10 or 10% of the total bill, whichever is greater. The other plan would allow $20 or 25%, whichever is greater. A finance charge based on an annual interest rate of 16% would be applied to any unpaid portion of the bill. Credit limits of $100, $300 or $500 would apply to both minimum payment plans.

The fourth plan would enable AT&T Communications' 300,000 Minnesota business customers to make full payments, as they do now. However, a late payment charge, based on an 18% annual interest rate, would apply to any payment made after 30 days.



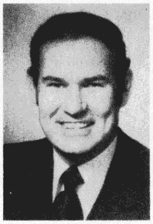
MOVING AROUND INDUSTRY

Racal-Vadic names two national sales managers

Racal-Vadic, Milpitas, Calif., has appointed Garrick Colwell and Ron Blaisdell as national managers. Colwell will be directing retail distribution of the company's Maxwell Modem, and Blaisdell will be handling industrial sales and support for representatives and distributors of all company products. Prior to joining Racal-Vadic, Colwell was with Intek Manufacturing. Blaisdell previously was with Applied Magnetics Corp.

Donnelley promotes Johnson and Lederer

Reuben H. Donnelley has promoted Kenneth O. Johnson to the position of president and Edward Lederer to vice president of Donnelley Directory. Johnson was most recently executive vice president of the company's Telco Operations. Lederer was formerly assistant vice president-sales planning. Donnelley Directory is one of two new units of Reuben H. Donnelley.


K. Johnson


E. Lederer

North Supply picks Scanlon

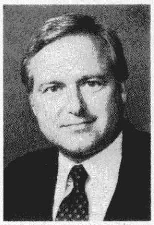
North Supply Co., Industrial Airport, Kan., has named Michael E. Scanlon as business equipment sales representative, Business Systems Div. He will be responsible for sales to interconnect companies in Iowa, southern Illinois and Missouri. Previously Scanlon was North's inside sales manager, United System Sales.

ITT chooses Thomas

Lee C. Thomas has been appointed vice president and director of sales for ITT Telecom Network Systems Div., Raleigh, N.C. He will be responsible for all sales activities in his division. Prior to joining ITT Thomas was director of advanced technology services for the ITT Advanced Technology Center.

Digital Switch selects senior vice president

Henry N. Nothhaft has been named senior vice president of marketing at Digital Switch Corp., Richardson, Texas. Nothhaft was previously vice president of marketing. Digital Switch designs, manufactures and markets digital telecommunications switching systems and transmission products.


H. Nothhaft


D. Lamirand

LorTec appoints sales manager

LorTec Power Systems, Inc., Elyria, Ohio, has appointed Dale I. Lamirand sales manager. In his new position, Lamirand will be responsible for managing and expanding the company's entire sales operation, including domestic and international sales. He also will continue to coordinate and supervise the corporate marketing communications program. He previously held positions as sales engineer and national accounts manager at LorTec.

O'Malley joins Telemobile

Martin (Tom) O'Malley has been appointed marketing manager for Telemobile Inc., Carson, Calif. He will be responsible for integrating the marketing program of the company's line of mobile telephones and interconnect terminal equipment. O'Malley has held previous positions with Yaesu Electronics and Dumont Mobile Communications.

Compath promotes Zovod to branch manager

David Zovod has been promoted to branch manager of the East Bay office for Compath National, Oakland, Calif. Prior to this appointment he served as branch manager of the Fresno office. Compath National distributes telecommunications equipment.

Byers hires Kanely as president and chief

Byers Communications Systems Inc., Atlanta, has named James R. Kanely as president and chief executive officer. Kanely will succeed Morgan Payne, who will continue to serve in the area of business development. In his new position Kanely will also become a director. Most recently Kanely was president and chief executive of Valtec.

Audichron elects president

Charles L. Graham has been elected president, chief executive officer and member

of the board by the board of directors of Audichron Co., Atlanta. Graham replaces L. Edmund Rast, who will remain as chairman of the board responsible for long range planning. Before this, Graham was group vice president of the business systems group for Continental Telecom, Atlanta. He is also the former group vice president, products group, for Northern Telecom, Inc.

Triplett appoints Anderson

Richard W. Anderson has been appointed to the position of director of marketing for Triplett Electrical Instrument Corp., Bluffton, Ohio. His responsibilities will include worldwide marketing and sales functions. Prior to joining Triplett, Anderson held various executive positions with AMF Inc.

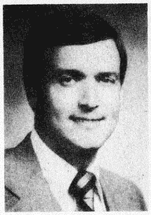
Fibronics selects president

Fibronics International, Inc., Hyannis, Mass., has named Joseph Maayan president/general manager. Maayan was previously chairman of the executive committee. Fibronics is an affiliate company for Elron Electronic Industries, Ltd.

Kroge appointed director at Radio materials

Kenneth W. Kroge has been appointed director of marketing for Radio Materials Corp., Attica, Ind. Kroge was most recently director of manufacturing operation with the Satellite Communications Div. of Harris Corp., Melbourne, Fla. In his new position, Kroge will direct all marketing activities including national and international sales.

K. Kroge



J. Strand

LinTelcom boosts Strand

James W. Strand has been promoted to the position of vice president marketing at Lincoln Telecommunications Co., Lincoln, Neb. He was most recently vice president and general manager of LinTel Systems, the company's equipment sales subsidiary.

Nynex names Bartolotta as regional sales manager

Nynex Mobile Communications Co., Pearl River, N.Y., has named Peter L. Bartolotta regional sales manager for the company's cellular retail subsidiary, Nynex Mobile Communications Retail Co. Bartolotta previously held sales and marketing positions with AT&T, Executone, Pitney Bowes and Xerox.

Progressive chooses two

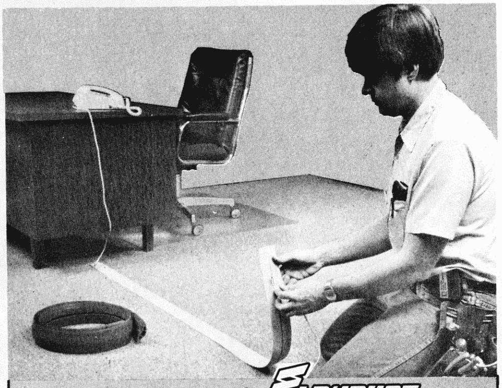
Progressive Electronics Inc., Mesa, Ariz., has named Steven Youtsey as director of marketing and Gary A. Hensley as regional sales manager. Youtsey will be responsible for all marketing and planning operations for the company. Hensley, formerly staff administrator with United Telephone Co. of Florida, will be in charge of sales in the southeastern U.S.

Maess named sales manager at Genesis Electronics

Jeff Maess has been named Midwest regional sales manager for Genesis Electronics Corp., Folsom, Calif. Maess will be responsible for sales of the company's voice mail products as well as the development of a distributor network in the Midwest. He was previously a regional sales executive for Harris Corp.

Starnet expands sales staff

Starnet Corp., Beverly Hills, Calif., has added five people to its national sales team. Susan Lynham will be with the Washington branch, Rick Newell will be an account executive in San Francisco, Robert Peganyee and Randell H. Sygal will be located at the Phoenix, Ariz., branch and Ester Zager will join the Miami branch.



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GW

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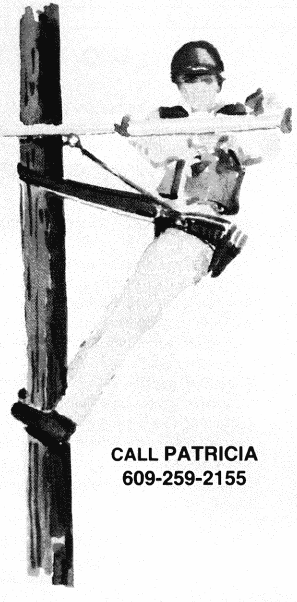

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Edited by Larry Lannon, executive editor-features

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"**Wilmington, Delaware,** is enjoying a novel service through the telephone exchange. Phonograph music is supplied over the wires to those subscribers who sign up for the service. Attached to the wall near the telephone is a box containing a special receiver, adapted to throw out a large volume of sound into the room. A megaphone may be attached whenever service is to be given. The box is attached to the line wires by a bridged tap from the line circuit. At the central office, the lines of musical subscribers are tapped to a manual board attended by an operator. A number of phonographs are available, and a representative assortment of records kept on hand. When plugged up to a phonograph, the subscriber's line is automatically made busy on the automatic switches with which the Wilmington exchange is equipped. Several lines can be connected to the same machine at the same time, if more than one happens to call for the same selection. Each musical subscriber is supplied with a special directory giving names and numbers of records, and the call number of the music department. When it is desired to entertain a party of friends, the user calls the music department and requests that a certain number be played. He releases and proceeds to fix the megaphone in position. At the same time the music operator plugs up a free phonograph to his line, slips on the record and starts the machine. At the conclusion of the piece the connection is pulled down, unless more performances have been requested. The rate of charge for this service is very reasonable. It is three cents for each ordinary piece, and seven cents for grand opera. The subscriber must guarantee $18 per year." *From TELEPHONY, Dec. 18, 1909, p. 699.*

"**Henry Winston,** a prosperous young farmer living near Fairfax, Missouri, did not reckon with the rural party line, to which his telephone was connected, when he called up Miss Lorena Simpson and asked her to share his joys and sorrows for life, and for that reason is in quite a predicament. Before Miss Lorena could answer his question, eleven fair damsels, who had heard, at their respective homes, the ring for the Simpson home, quickly stepped to the telephone. Each, knowing full well that 'something would be doing,' had quickly answered 'Yes,' adding, 'You set the date and I'll be on hand.' Although Henry knows he is engaged, and that it is not Miss Simpson who accepted, he is a little in doubt as to which one of the eleven answered his question first." *From TELEPHONY, Dec. 25, 1909, p. 727.*

"**A fire at Bass,** Michigan, destroyed the switchboard of the Bass Telephone Company. The Kellogg Switchboard & Supply Co. received the order at 10:35 Friday, Nov. 26, and shipped the board complete on the first train Saturday for Bass, which left at 10:30 a.m." *From TELEPHONY, Dec. 25, 1909, p. 727.*

50 years ago. . .

"**The hearing** before the telephone division of the Federal Communications Commission on the unification of the telegraph systems of the country was concluded on Wednesday, December 5. Members of the commission indicated at the conclusion of the three-day hearing that legislation providing for consolidation would probably be drafted and be ready for Congress within a short time. 'Whatever is done,' said Commissioner Payne, 'you can be certain that labor will be protected to the best of our ability.'" *From TELEPHONY, Dec. 15, 1934, p. 14.*

"**Sixty men prominent** in the telephone industry in Ohio met at Crestline in their home state on November 24 to witness the cut-over of the new all-relay automatic exchange installed by The Northern Ohio Telephone Co. in that city. This installation has attracted much attention, not only for the reason that it is the largest exchange of the all-relay type in the country, but also by reason of the incorporation in it of a number of new features and facilities recently developed for city and private exchange service. The city exchange is planned and cabled for line capacity of 1000 lines, with five line units of 100 lines, to which are connected a present equipment of 430 working lines. Growth is anticipated to the full capacity of the equipment, and provision is made in the plans and designs for an even larger equipment, to permit its expansion by the inclusion of second selectors to a capacity of up to 9000 lines." *From TELEPHONY, Dec. 15, 1934, p. 24.*

"**There are many** encouraging and convincing indications, as the year 1934 comes to a close, that the upward climb of 'Recovery Hill' by the telephone industry, started in the closing months of 1933, was really the beginning of slow but substantial recovery from the depression. For 1934 practically all telephone companies will show a net gain of stations. The companies of the Independent group will average a gain of approximately 3 per cent in stations over the number in service at the beginning of the year. The number of telephones in the group at the end of the year is estimated as 3,670,000, a gain of 107,000. The Bell System companies report a gain of about 2.15 per cent in stations during the year. This represents 295,000 stations, making the total number of telephones for the Bell group approximately 13,457,000. The total number of telephones in service, Bell and Independent, as the year closes, is approximately 17,127,000 as compared with 16,711,000 at the end of 1933, a gain of about 2.4 per cent. This compares with a loss of approximately 4.1 per cent for 1933." *From TELEPHONY, Dec. 29, 1934, p. 7.*

25 years ago. . .

"**Two women** of the Millburn, N.J., area, who on Nov. 14 allegedly failed to yield a party line to Dr. Marvin Becker, so that he could telephone for an ambulance for an 81-year-old heart attack victim, faced a municipal hearing at Millburn on Nov. 28." *From TELEPHONY, Dec. 12, 1959, p. 46.*

"**The Independent** industry, through the efforts of the USITA national advertising program, is becoming known to the public. . . ." *From TELEPHONY, Dec. 12, 1959, p. 65.*

"**An experimental ground** station for sending and receiving telephone messages by way of man-made satellites is taking shape on a hilltop in Holmdel, N.J., Bell Telephone Laboratories announced on Oct. 2. The station, under construction by Bell Labs on Crawford Hill, could point the way to a network of terminals for sending telephone calls and live television to distant parts of the world. These stations would 'bounce' radio signals off dozens of 'sky-mirror' satellites. The station will include control buildings and two large antennas for communications experiments with objects in outer space. One of the uses of the installation will be to take part in communications projects sponsored by the National Aeronautics & Space Administration (NASA). One of the projects at Holmdel will test the quality of radio signals transmitted between stations on opposite sides of the United States by means of reflection from a satellite. Although single telephone channels will be used in the experiment, the objective is to determine whether television's 'broadband signals' (the equivalent of about 900 telephone channels) could also be transmitted, Bell Labs stated." *From TELEPHONY, Oct. 17, 1959, p. 26.*

"**Dial equipment** is to be installed in Cairo, Egypt, as well as five other towns on the Nile Delta, under an initial 5-million-dollar improvement program undertaken by the United Arab Republic. Equipment will be furnished to serve 44,000 subscribers. In Cairo, 30,000 local lines will be provided for two exchanges. Local exchange equipment will also be delivered to the towns of Benha, Dmanhur, Mahalla el Kubra, Mansura and Tantah in the Nile Delta near Cairo. *From TELEPHONY, Dec. 5, 1959, p. 74.*

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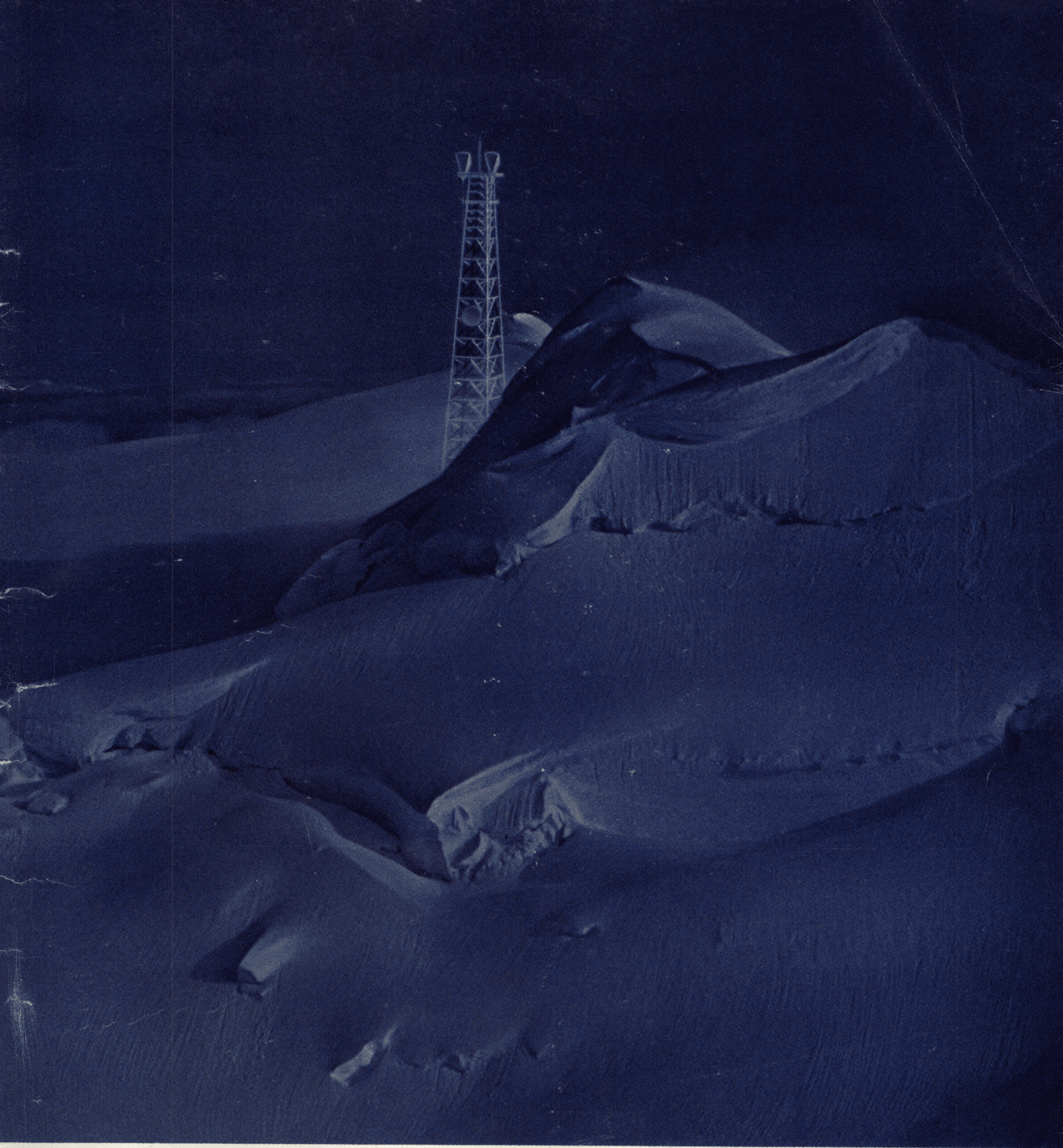

Season's Greetings And Happy Anniversary

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In 1984 our Industry began to understand just what "The Butler Advantage" really means. The growth of Butler Telecommunications Group as our Industry's leading service organization could not have been achieved without Industry confidence and support, and the efforts of our employees. It has been quite a year for Butler, too. Thank you one and all.

On this "double occasion", we would like to extend our best wishes to our Industry friends, colleagues, employees, and their families for this Holiday Season, and join with them in celebrating our new Industry's first anniversary. Many happy returns.

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Q____Accounting
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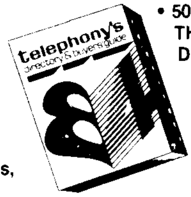

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